

AD-A072 142

ARMY COMMUNICATIONS COMMAND FORT HUACHUCA AZ
STANDARD ENGINEERING INSTALLATION PACKAGE. UNINTERRUPTIBLE POWE--ETC(U)
JUL 79

F/G 9/3

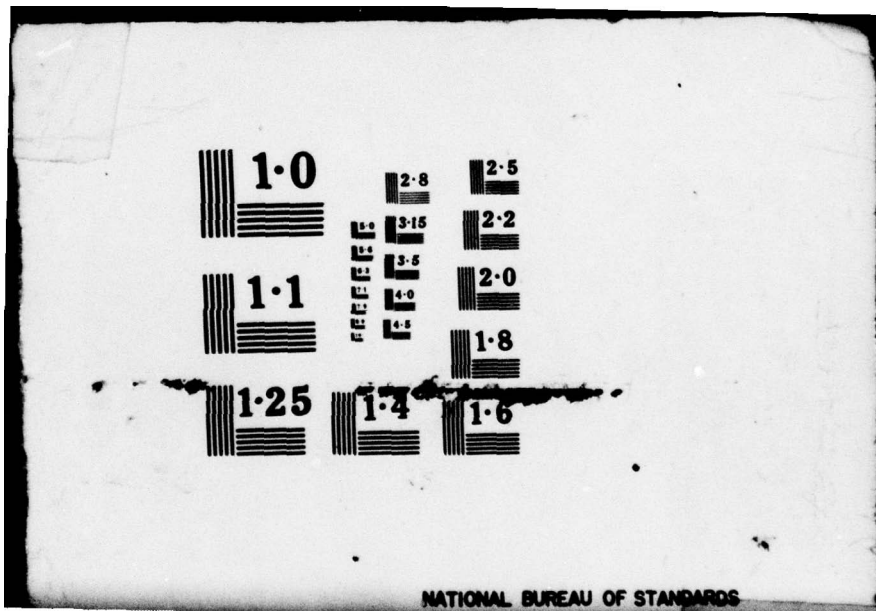
UNCLASSIFIED

ACC-SEIP-020

NL

1 OF 4
AD
A072142







SEIP 020

LEVEL

12
B.S.

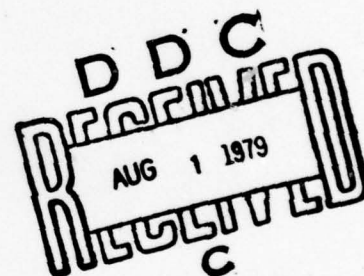
DA072142

VOICE OF THE ARMY

**STANDARD
ENGINEERING INSTALLATION PACKAGE**

**UNINTERRUPTIBLE
POWER FACILITIES**

(48 VOLTS d.c.)



FILE COPY

1 JULY 1979

APPROVED FOR PUBLIC RELEASE. DISTRIBUTION UNLIMITED.

**HEADQUARTERS
U. S. ARMY COMMUNICATIONS COMMAND
FORT HUACHUCA, ARIZONA 85613**

79 07 31 024

DISPOSITION INSTRUCTIONS

Destroy this document when no longer needed.
Do not return it to the originator.

DISCLAIMER

The use of trade names in this document does not constitute an official endorsement or approval of the use of such commercial hardware or software. This document may not be cited for purposes of advertisement.

AVAILABILITY

This publication is available to non-Government agencies and may be purchased through the Defense Documentation Center, Cameron Station, Alexandria, VA 22314.

Government activities may requisition copies by writing to the Commander, Headquarters, Fort Huachuca, ATTN: CCH-PCA-ASP, Fort Huachuca, Arizona 85613.

NEUTRAL LANGUAGE

The word "he" when used in this publication represents both the masculine and feminine genders, unless specifically stated otherwise.

CERTIFICATION

The certifications/verifications contained in this publication are essential to the conduct of the business of the Government.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SEIP 020	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Standard Engineering Installation Package, Uninterruptible Power Facilities 48 V Dc 148 Volts d.c.).		5. TYPE OF REPORT & PERIOD COVERED Final, Indefinite
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP, Fort Huachuca, AZ 85613		8. CONTRACT OR GRANT NUMBER(s) Final rept.
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Communications Command ATTN: CC-PA-AMP Fort Huachuca, AZ 85613		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS ACC-SEIP-020
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) US Army Communications Command ATTN: CC-OPS-SM Fort Huachuca, AZ 85613		12. REPORT DATE
16. DISTRIBUTION STATEMENT (of this Report) 12 374 p		13. NUMBER OF PAGES
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) 11 1 Jul 79		15. SECURITY CLASS. (of this report) Unclassified
18. SUPPLEMENTARY NOTES		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) battery facility, 48-V dc counterelectromotive force (CEMF) cell end cells fused dc distribution inverters, dc-ac lead-acid batteries powerboards rectifier-chargers uninterruptible power		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This Standard Engineering Installation Package (SEIP) assists project officers, logisticians, engineers, and technicians to program, procure, engineer, and install 48-V dc uninterruptible power facilities. The SEIP includes a discussion of principles of operation, bill of materials, installation instructions (including drawings), and test procedures. 408 562		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS COMMAND
Fort Huachuca, Arizona 85613

USACC SEIP
No. 020

1 July 1979

Standard Engineering Installation Package
UNINTERRUPTIBLE POWER FACILITIES (48 V DC)

Paragraph Page

SECTION 1. GENERAL

1.1	PURPOSE.	1-1
1.2	SCOPE.	1-1
1.3	SYSTEM DESCRIPTION	1-1
1.4	EQUIPMENT FUNCTION	1-1
1.5	COMMON ENGINEERING CONSIDERATIONS.	1-2
1.6	DESCRIPTION OF OPERATION	1-16
1.7	PROTECTION OF AC CIRCUITS.	1-27
1.8	BATTERY FACILITY AVAILABILITY.	1-27
1.9	INVERTER CONSIDERATIONS.	1-27
1.10	DC-DC CONVERTERS	1-32
1.11	AUTOMATIC EMERGENCY LIGHTING	1-32
1.12	APPLICABLE DOCUMENTS	1-35
1.13	COMMENTS ON PUBLICATION.	1-36

SECTION 2. SITE SURVEY AND DATA CHECKLIST

2.1	SITE SURVEY CRITERIA	2-1
2.2	DATA TO BE OBTAINED.	2-1
2.3	SITE SUPPORT	2-1
2.4	EQUIPMENT CHARACTERISTICS.	2-2

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1	INTRODUCTION	3-1
3.2	GENERAL INSTRUCTIONS	3-1
3.3	INSTALLATION SPECIFICATIONS.	3-3

SECTION 4. ENGINEERING INSTALLATION DRAWINGS

4.1	GENERAL.	4-1
4.2	MODIFICATION OF INSTALLATION DRAWINGS.	4-1

Paragraph

Page

SECTION 5. BILL OF MATERIALS

5.1	GENERAL.	5-1
5.2	BILL OF MATERIALS.	5-1

SECTION 6. QUALITY ASSURANCE PROCEDURES

6.1	GENERAL.	6-1
6.2	INSPECTION RESPONSIBILITIES.	6-1
6.3	DOCUMENTATION.	6-4
6.4	QUALITY ASSURANCE PLAN	6-4

SECTION 7. TEST AND ACCEPTANCE

7.1	GENERAL.	7-1
7.2	DESCRIPTION OF FACILITIES.	7-1
7.3	INSPECTIONS, MEASUREMENTS, AND TESTS TO BE PERFORMED	7-1
7.4	TEST EQUIPMENT REQUIRED.	7-1
7.5	GENERAL TEST CONDITIONS.	7-16
7.6	TEST METHODS AND PROCEDURES.	7-16

SECTION 8. COMPLETION CERTIFICATION

8.1	GENERAL.	8-1
8.2	DISTRIBUTION	8-1
8.3	WAIVERS.	8-1
8.4	TAR PREPARATION INSTRUCTIONS	8-1

LIST OF ILLUSTRATIONS

Figure No.

1-1	Typical 48-V Dc Capacitor Filter Panel	1-5
1-2	Typical LC Communications Equipment Decen- tralizing Filter for Loads up to 10 A Dc.	1-6
1-3	Typical 48-V Dc Pi Network Communications Equipment Decentralizing Filter for Loads up to 25 A Dc	1-7
1-4	Typical 48-V Dc Filtering of Larger Inverters.	1-9
1-5	Wire Size Selection Nomogram	1-13
1-6	48-V Dc, 50-A Basic Battery Facility Diagram	1-17
1-7	48-V Dc, 100-A CEMF Cell Battery Facility Diagram	1-20
1-8	48-V Dc, 200-A Battery Facility With CEMF Cell Load Voltage Control.	1-23

LIST OF ILLUSTRATIONS (Continued)

Figure No.		Page
1-9	Simplified Block Diagram of 48-V Dc, 400-A Battery Facility with One-Step, Three-Cell, End Cell Voltage Control.	1-24
1-10	Availability Model for a Complete Battery Facility.	1-28
1-11	Inverter Transfer and Manual Bypass Diagram. . .	1-30
1-12	Inverter Output Power Factor Correction for Greater Inverter Output Capability.	1-31
1-13	Emergency Lighting Operating From the Station 48-V Dc Battery Facility.	1-34
5-1	Bill of Materials for 48-V Dc 50-A Basic Battery Facility.	5-2
5-2	Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility	5-21
5-3	Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility	5-41
5-4	Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility.	5-64
6-1	Installation and Test Sequence	6-2
6-2	QA Inspection Checklist - Installation	6-6
6-3	QA Points of Contact	6-17
6-4	QC Checklist - Installation.	6-18
7-1	Resistive Adjustable Dummy Load.	7-3
7-2	Test Equipment Connections for Ampere-Hour Capacity Test	7-19
7-3	Typical Ampere-Hour Discharge Curve.	7-20
7-4	Capacitive-Coupled Test Cable Used With the Transmission and Noise Measuring Set.	7-23
8-1	Technical Acceptance Recommendation.	8-5

LIST OF TABLES

Table No.

1-1	Recommended Ground Reference Wire Sizes for Dc Power Supplies and Battery Facilities	1-4
1-2	Equivalent Wire Size Table	1-12
1-3	Approximate Recharge Times for Selected 50-A, 100-A, and 200-A Battery Facilities	1-26
1-4	Approximate Recharge Times for Selected 400-A Battery Facility.	1-27
1-5	Small Power Factor Corrective Capacitors	1-33
1-6	Single-Phase Large Power Factor Corrective Capacitors.	1-33

LIST OF TABLES (Continued)

Table No.

2-1	Major Equipment Characteristics.	2-3
3-1	Sulphuric Battery Acid Mixing Chart for Mixing by Volume	3-6
7-1	Inspections, Tests, and Measurements on Battery Banks	7-4
7-2	Measurements and Tests on Individual Main Rectifier-Chargers.	7-5
7-3	Measurements and Tests on End Cell Rectifier- Chargers.	7-9
7-4	Measurements and Tests on Complete Battery Facility, Test Status	7-11
7-5	Measurements and Tests on Complete Battery Facility, Actual Operation.	7-13

Accession For		<input checked="checked" type="checkbox"/>
NTIS GRA&I		<input type="checkbox"/>
DDC TAB		<input type="checkbox"/>
Unannounced		
Justification		
By _____		
Distribution/		
Availability Codes		
Dist.	Avail and/or	special
<input checked="checked" type="checkbox"/>		

SECTION 1. GENERAL

1.1 PURPOSE. The purpose of this Standard Engineering Installation Package (SEIP) is to provide detailed guidance for engineering, installing, and testing uninterruptible 48-V dc power facilities.

1.2 SCOPE. The SEIP is applicable to all US Army Communications Command (USACC) engineering-installation (E-I) activities involved in the planning and implementation of 48-V dc battery facilities with load capacities from 50 to 400 amperes.

1.3 SYSTEM DESCRIPTION. The 48-V dc power facilities provided under this SEIP are of the floating battery type consisting of the following:

Continuous capacity, A	Load voltage control	Number of battery cells	Operating time on battery, hours
50	Rectifier-charger and battery terminal voltage	23	1, 4 & 8
100	3-V CEMF cell	24	1, 4 & 8
200	3-V CEMF cell	24	1, 4 & 8
400	One step of 3 end cells	26	1, 4 & 8

Also included in this SEIP are three types of main distribution methods, several localized (cabinet) fuse distribution panels or blocks, and inverters from 0.5 to 10 kVA.

1.4 EQUIPMENT FUNCTION. The battery facilities are designed to provide uninterrupted 48-V dc power to all types of communications and other power equipment. The continuous capacities from 50 to 400 amperes should suffice for most applications. In case of an ac power failure, each facility can maintain power at full rated load for 1 to 8 hours, depending on the battery bank selected. The inverters provide uninterrupted 120-V ac, single phase, 50- or 60-Hz power to critical ac-powered communications equipment.

1.5 COMMON ENGINEERING CONSIDERATIONS.

1.5.1 General. Proper design of battery facilities is essential for optimum communications equipment performance. Poor dc power source engineering, installation practices, adjustments, and wiring practices lead to short duration when on battery power and to needless electrical noise.

1.5.2 Location of Power Equipment. Large dc power equipment must be physically and electrically separate from sensitive communications equipment. A separate building with individual battery and dc equipment rooms is best. Dc equipment can also be collocated with ac power equipment in the ac powerhouse. A basement location is satisfactory if clean and suitable environmental conditions are provided. Separate battery and dc equipment rooms near the communications facilities should be provided if the above locations are not feasible. The installation of dc power equipment must insulate it from the surrounding communications equipment if this is the only available location.

1.5.3 Electrical Noise Sources and Conduction. Dc power equipment (rectifier-chargers, dc-ac inverters, dc-dc converters, contactors, etc.) is electrically noisy due to switching of sizable currents and inductive circuitry. The electrical noise is present on the equipment enclosures or frames. Metal-to-metal contact between the dc power equipment and cable ladders, ducts, and conduits, or sometimes deliberate wire connections to the signal ground wire network cause the electrical noise to be conducted to the communications equipment throughout the communications station.

1.5.4 Grounding.

a. Dc power equipment requires grounding for safety only. This can be accomplished by means of the ac protective (green) wire. If the dc equipment is located with the communications equipment, the effect of electrical noise conducted by the ac protective wire can be minimized by connecting it to the ac protective bus bar in the main ac power entry panel. If this is not feasible, an intermediate ac power distribution panel away from the communications equipment can be used. The ac panel supplying the dc power equipment can be used if the above is impractical. Where the dc and communications equipment are in separate areas, the ac power panel supplying the dc power equipment should be used.

b. If the battery rack or the dc equipment racks are within 6 feet of a lightning downconductor, the lightning downconductor can be moved farther away. Where this is not desirable, the dc equipment and battery racks must be grounded to the lightning downconductor near the earth. An alternate safe method which allows isolation under normal conditions is to install a gas spark gap or other break-down device with a rating of approximately 100 V between the dc equipment and downconductor.

1.5.5 Ground Reference Wire.

a. The voltage return load bus bar (plus bar for a negative facility) must be insulated from the equipment rack or cabinet. The ground reference wire should be connected to the common distribution point closest to the loads or at one central load which is not likely to be removed. At the other end, the ground reference wire should be connected directly to the exterior earth ground electrode network or as close to it as practical. Recommended ground reference wire sizes are listed in table 1-1.

b. The dc ground reference wire should have a yellow insulating covering or be color-coded with yellow plastic tape at key points to distinguish it from other ground conductors. (An identification tag can be used in addition.) No other conductors shall be connected to the dc ground reference wire.

1.5.6 Filtering.

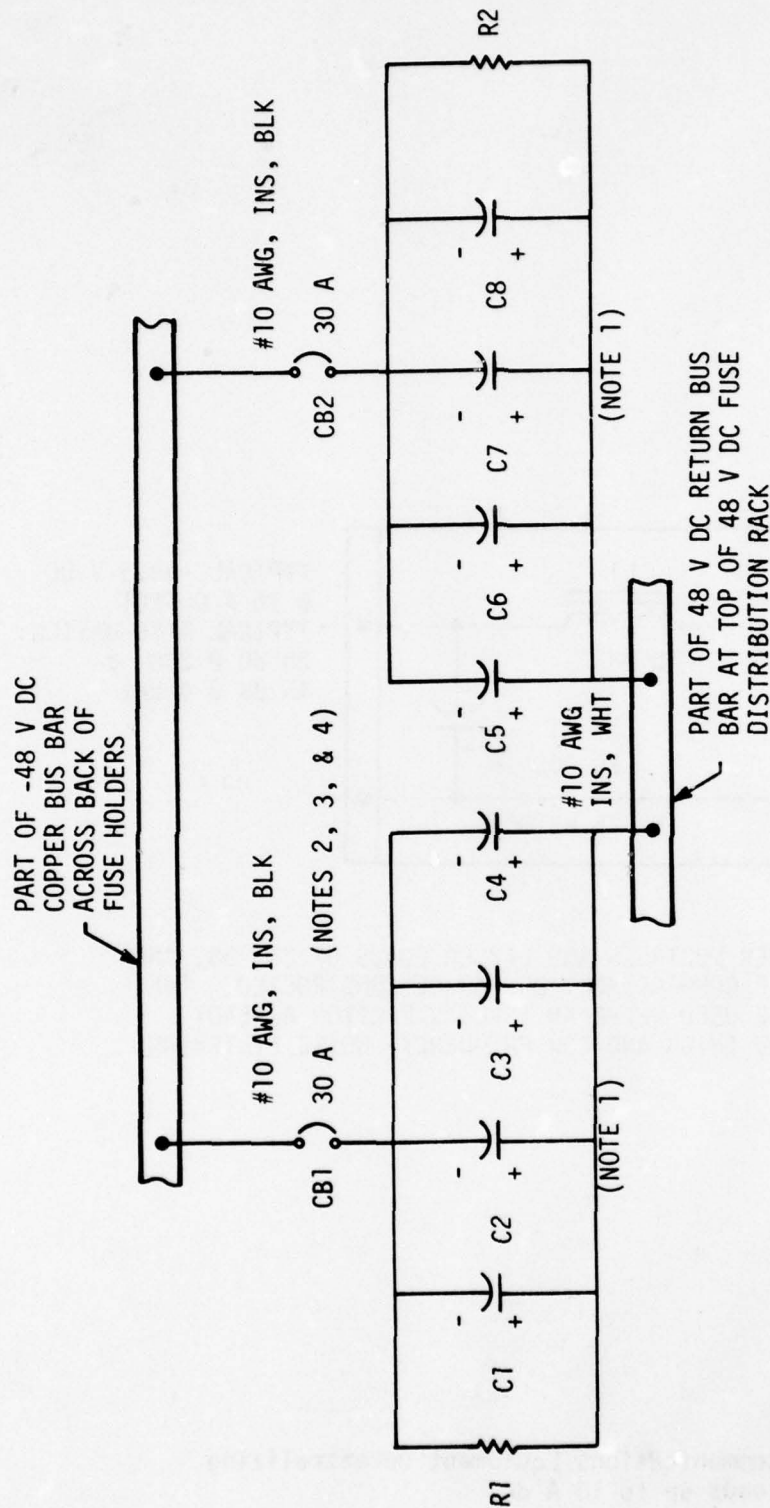
a. The noise voltages (ripple, impulse, and wideband) in the dc power supply should not exceed 200 mVp-p for most communications equipment. One important exception is electromechanical telephone switching equipment, for which the limit is 500 mVp-p. This higher limit applies only to electromechanical switches - the 200 mVp-p limit applies to electronic switches.

b. Additional filtering for the battery facility is generally required when the noise voltages (ripple, impulse, and wideband) across the supply distribution points of a station VF power supply or battery facility exceed 200 mVp-p. If the electrical noise is mainly ripple, capacitor filters made up of several large electrolytic capacitors are generally used, as shown in figure 1-1. Where wideband (10 Hz to 25 MHz) noise filtering is required, the inductance-capacitance (LC) filter shown in figure 1-2 is very useful, especially if input filter capacitors already exist as part of the power supply. A pi network filter is shown in figure 1-3. The capacitor at the input, in conjunction with the inductor and output capacitor, provides better filtering. If input lead length is appreciable, this combination acts as a two-section L-C filter, with still greater attenuation of higher frequencies.

Table 1-1. Recommended Ground Reference Wire Sizes for Dc Power Supplies and Battery Facilities

Full load power supply or battery facility rating, A dc	Recommended wire type and size, AWG
0 to 25	#12* solid or stranded, insulated, yellow
Over 25 to 50	#8* solid or stranded, insulated, yellow
Over 50 to 100	#6* solid or stranded, insulated, yellow
Over 100 to 200	#4 solid or stranded, insulated, yellow
Over 200 to 400	#2 stranded, insulated, yellow
Over 400 to 800	#0 stranded, insulated, yellow
Over 800	#2/0 stranded, insulated, yellow

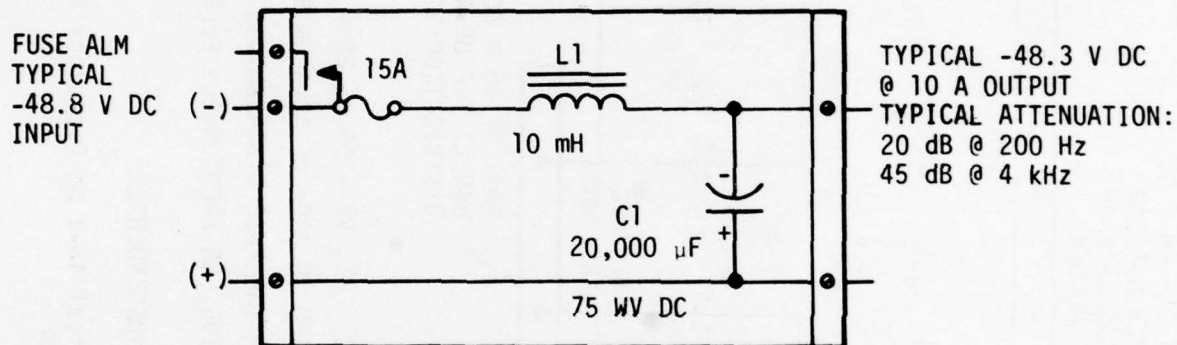
*If the dc reference wire exits the building to the exterior earth ground electrode network, the minimum wire size for the outside portion shall be #4 AWG. Brazed, exothermic welded, and covered mechanical clamp splices are permitted. The required wire size over #4 AWG may be made up of two smaller wires having equivalent total cross sections.



NOTES:

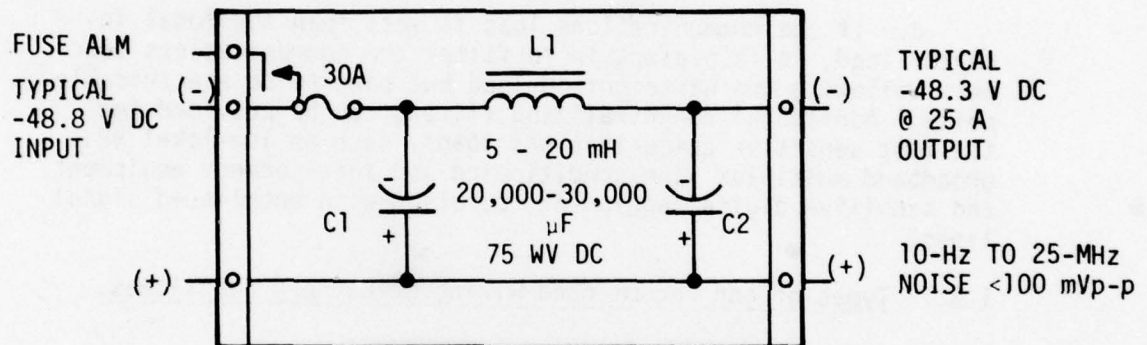
1. C1 to C8--20,000-40,000 μ F, 75 WV DC. R1, R2--200 Ω , 25 W.
2. CAPACITORS AND OTHER PARTS ARE MOUNTED IN BACK OF AN ALUMINUM PANEL; REFER TO STD-MS-0023.
3. THIS PANEL IS GENERALLY INSTALLED IN THE FUSE DISTRIBUTION RACK.
4. THE CAPACITOR FILTER IS VERY EFFECTIVE FOR FREQUENCIES BELOW ABOUT 1 MHz IF CONNECTING WIRES ARE KEPT VERY SHORT.
5. THE TWO SECTIONS CAN ALSO BE USED INDEPENDENTLY.

Figure 1-1. Typical 48-V Dc Capacitor Filter Panel.



NOTE: LC FILTERS FOR OTHER VOLTAGES AND LARGER LOADS OF 25, 50, AND 100 A ARE AVAILABLE COMMERCIALY OR CAN BE CONSTRUCTED. THE LC FILTER SHOULD BE USED WHERE AN INPUT CAPACITOR ALREADY EXISTS AND WIDEBAND (HIGH AND LOW FREQUENCY) NOISE FILTERING IS REQUIRED.

Figure 1-2. Typical LC Communications Equipment Decentralizing Filter for Loads up to 10 A dc.



NOTE: PI NETWORK FILTERS FOR OTHER VOLTAGES AND ALL TYPES OF LOADS ARE AVAILABLE COMMERCIALY OR CAN BE CONSTRUCTED. THE PI NETWORK FILTER IS USED WHERE NO INPUT CAPACITOR EXISTS OR GREATER EFFECTIVENESS IS REQUIRED.

Figure 1-3. Typical 48-V Dc Pi Network Communications Equipment Decentralizing Filter for Loads up to 25 A Dc.

c. Both LC and pi network filters are also effective decentralizing filters. Loads which generate electrical noise and conduct this to the supply lines are effectively isolated from each other if separate filters are used for the offending loads. Filtering for electromechanical telephone switches, if required, should be separate from filters for other communications equipment. Dc to ac inverters should be filtered separately. Filtering for two dc-ac inverters is shown in figure 1-4. Considerable electrical impulse noise, up to 5 Vp-p, is generated by the input switching operation of some large inverters. The filters minimize the electrical noise at the common load distribution point. Separate filters are recommended to keep potential open or short circuits in one inverter from affecting the other unit.

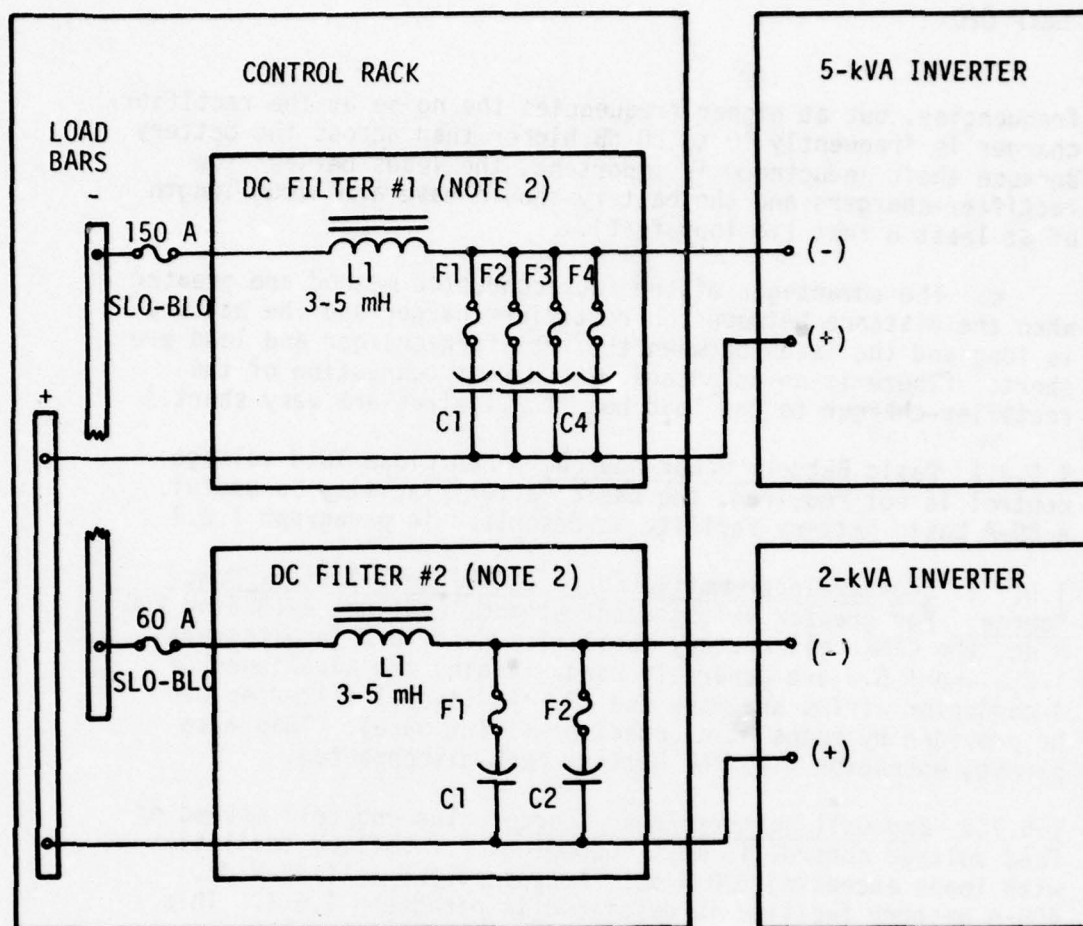
d. If the communications load is less than the total inverter load, it is preferable to filter the communications load only, allowing the distribution load bus bars to be electrically noisy. Additional decentralizing filters can be provided for the most sensitive communications loads, such as low-level VF, broadband multiplex line-conditioning and interconnect equipment, and sensitive digital equipment operating with unbalanced signal lines.

1.5.7 Types of and Recommended Wiring of Battery Facilities.

1.5.7.1 The Four-Conductor Wiring Method.

a. The output of rectifier-chargers is inherently noisy electrically, even though filtering is incorporated in their design. The output contains not only ripple of the rectified alternating current, but also noise spikes generated by the silicon-controlled rectifier diodes. The rectifier-chargers, the battery bank, and the load buses should be interconnected so as to minimize transmission of rectifier-charger noise to the communications equipment. To accomplish this, the preferred method is to use the battery terminals as the common interconnect point for the load and the rectifier-chargers. This configuration is referred to as the four-conductor method.

b. The inherent characteristic of a chargeable battery is to absorb current when a higher voltage is impressed on its terminals and to supply current during periods of lower voltage. This inherent characteristic acts to smooth the rectified ac from dc to high frequency. In addition, the inductance of the leads and the apparent large capacitance of the battery form a simple noise filter. This noise filter is not very effective at low



NOTES:

1. THIS ADDITIONAL FILTERING IS REQUIRED ONLY IF THE ELECTRICAL NOISE ON THE COMMON LOAD BARS IS EXCESSIVE AS DETERMINED BY COMMUNICATIONS EQUIPMENT OPERATION. GENERALLY, 2000 mVp-p IS PERMISSIBLE WHERE DECENTRALIZING FILTERS ARE ALSO USED FOR THE SENSITIVE EQUIPMENT.
2. EACH INVERTER INPUT SHOULD BE FILTERED SEPARATELY. (THERE MAY BE ENOUGH STORED ENERGY IN FILTER INDUCTOR L1 TO BLOW THE MAIN FUSES OF BOTH INVERTERS IN CASE OF FAILURE (OPEN OR SHORT) OF EITHER, IF THE TWO INPUTS ARE CONNECTED TO ONE FILTER.)
3. F1, F2--20 A SLO-BLO
C1, C2, C3, C4--35,000 μ F, 75 WV DC.

Figure 1-4. Typical 48-V Dc Filtering of Large Inverters.

frequencies, but at higher frequencies the noise at the rectifier-charger is frequently 10 to 20 dB higher than across the battery. Because their inductance is important, the leads between the rectifier-chargers and the battery should have a minimum length of at least 8 feet (16 loop feet).

c. The advantages of the four-conductor method are greater when the distance between the rectifier-charger and the battery is long and the leads between the rectifier-charger and load are short. (There is no advantage over direct connection of the rectifier-charger to the load bus if all wires are very short.)

1.5.7.2 Basic Battery Power Source. When close load voltage control is not required, the basic battery facility is useful. A 50-A basic battery facility is described in paragraph 1.6.1.

1.5.7.3 Counterelectromotive Force (CEMF) Cell Battery Power Source. For greater voltage control and loads not exceeding 200 A dc, the CEMF cell battery facilities described in paragraphs 1.6.2 and 1.6.3 are generally used. Again, the advantages of 4-conductor wiring are made use of. Additional filtering can be provided by means of a capacitor filter panel. This also permits operation with the battery bank disconnected.

1.5.7.4 End Cell Battery Power Source. The end cell method of load voltage control is most economical for battery facilities with loads exceeding 200 A dc. A typical end cell 48-V dc, 400-A battery facility is described in paragraph 1.6.4. This SEIP covers only the most usual end cell operation with one step of 6 volts. For special applications, two steps of 4 volts each have also been used. Battery facilities of 600 A, 800 A, 1200 A and greater also use end-cell operation.

1.5.8 Selection Criteria for Wire Sizes for Dc Power Wiring.

1.5.8.1 General. Frequently, short duration on battery power is due mainly to excessive voltage drop between the battery bank terminals and the end load terminals. Most 48-V dc-powered communications equipment fails to operate properly when the supply voltage has dropped to between 42 and 44 V dc. Simply stated, the less the voltage drop in the leads, the longer the operating time on battery power. Less than optimum float voltage adjustments also reduce the operating time. Correct float and equalize voltages for 48-V dc battery facilities are given in paragraphs 1.6.1-1.6.4.

1.5.8.2 Wire Selection Criteria.

a. Wire size must be selected on the basis of two criteria:

- (1) Normal current-carrying capacity.
- (2) Permissible voltage drop.

b. The current-carrying capacities of copper wires are given in tables 310-16 through 310-19 of the National Electrical Code. These capacities are based on safety considerations and take into account the heating of the conductors. For short loop lengths, the current-carrying capacity governs. The permissible voltage drop controls the wire size for longer loops.

1.5.8.3 Wire Size Selection. The wire size for each application can be calculated by using Ohm's law and table 1-2, or by using the nomogram, figure 1-5.

a. Knowing the amount of current to be supplied and the voltage drop that can be accepted, plot a line between the "AMPS" column and the "VOLTAGE DROP" column, intersecting the "OHMS" column.

b. Knowing the length of the power run to be installed, multiply the length by two to obtain the loop feet.

c. Plot a line from the "LOOP FEET" column, intersecting the same point on the "OHMS" column as in step "a" above, to the "WIRE SIZE" column.

d. Read the wire size from the "A" or "B" side of the "WIRE SIZE" column. Note that the A and B columns must not be interchanged; that is, current readings from the "AMPS" column A apply only to the "OHMS" column A and "WIRE SIZE" column A.

e. Example: A current of 75 A is required at a distribution cabinet at 49.65 V dc. The voltage at the power board is 50.0 V dc, and the distribution cabinet is separated from the power board by 45 feet of duct. What size cable is required?

Step a: $0.35 \text{ V} / 75 \text{ A} = 0.004667 \text{ ohms}$

Step b: $45 \text{ feet} \times 2 = 90 \text{ loop feet}$

Step c: Number 0000 wire (#4/0 AWG) is indicated.
1,000 feet of #4/0 wire has a dc resistance
of 0.04901 ohm, or 90 feet = .004411 ohm.

Table 1-2. Equivalent Wire Size Table

AWG & B&S gage	Area, circular mils	Metric size		Dc resistance per 1,000 feet at 20° C, annealed copper, ohms
		Diameter, mm	Area, mm ²	
	1,000,000	25.40	506.7	0.01037
	750,000	22.00	380.0	0.01383
	500,000	17.96	253.3	0.02074
	250,000	12.70	126.7	0.04148
0000	211,600	11.68	107.2	0.04901
000	167,800	10.40	85.0	0.06180
00	133,100	9.27	67.4	0.07793
0	105,600	8.25	53.5	0.09827
1	83,690	7.35	42.4	0.1239
2	66,370	6.54	33.6	0.1563
4	41,740	5.19	21.1	0.2485
6	26,250	4.12	13.3	0.3951
8	16,510	3.26	8.37	0.6282
10	10,380	2.59	5.26	0.9989
12	6,530	2.05	3.31	1.588
14	4,107	1.63	2.08	2.525
16	2,583	1.29	1.31	4.016
18	1,624	1.02	0.823	6.385
20	1,022	0.812	0.518	10.15
22	642.4	0.644	0.326	16.14

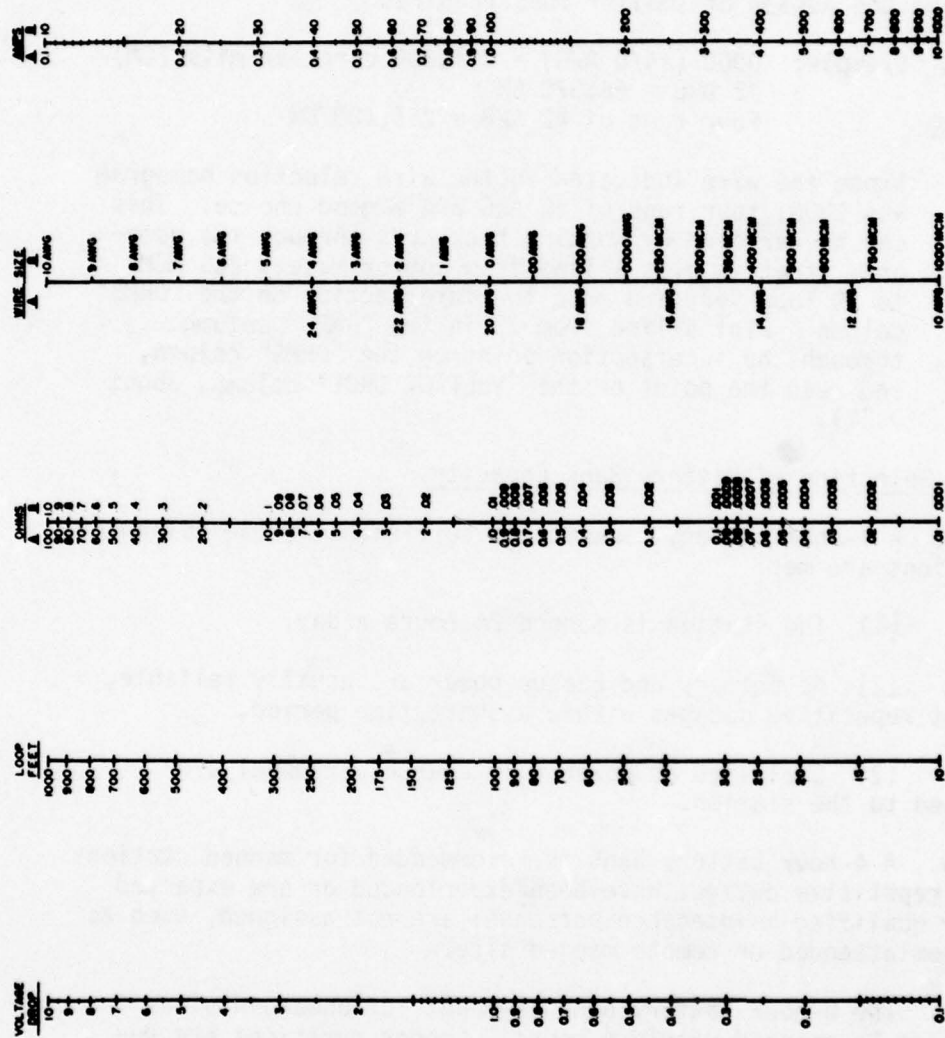


Figure 1-5. Wire Size Selection Nomogram.

f. If metric wire size is desired, use the equivalent wire size table to determine the diameter in mm or the area in mm².

g. If a number of smaller wires are desired for easier handling and bending, or because of availability, use the "circular mils" column of the equivalent wire size table to determine the number of smaller runs required.

h. Example: 0000 (#4/0 AWG) = 211,600 circular mils (CM)
 #2 AWG = 66,370 CM
 Four runs of #2 AWG = 265,480 CM

Since the wire indicated in the wire selection nomogram was 0000, four runs of #2 AWG are a good choice. This can be verified by working backwards through the nomogram (that is plot a line from approximately 265 MCM to 90 loop feet and note the intersection on the "OHMS" column. Plot a line from 75 in the "AMPS" column, through the intersection point on the "OHMS" column, and read the point on the "VOLTAGE DROP" column, about 0.27).

1.5.9 Selection of Battery Bank Capacity.

a. A 1-hour battery capacity is sufficient if the following conditions are met:

- (1) The station is manned 24 hours a day,
- (2) Ac primary and backup power are usually reliable, without repetitive outages within a short time period,
- (3) Qualified dc power maintenance personnel are assigned to the station.

b. A 4-hour battery bank is recommended for manned stations where repetitive outages have been experienced or are expected and/or qualified maintenance personnel are not assigned, such as at a semiattended or remote manned site.

c. The 8-hour battery bank is meant for unmanned sites which can be reached within 4 hours. Longer durations are required for even more remote sites.

d. Batteries of 1-, 4-, and 8-hour capacities for 50-A, 100-A, 200-A, and 400-A loads are included in section 4 of this SEIP.

1.5.10 Recharge Considerations.

a. In normal operation, battery recharge is automatic, at constant voltage, when ac power is restored. This method provides a high initial charge rate with an exponential taper of charging current to a final very low maintaining (trickle) current. For faster recharge, the rectifier-chargers can be switched to the equalize position manually. When the charging current has dropped to 20 percent of its initial value, the rectifier-chargers should be switched to the float position. An optional automatic timer is available for this function. The timer is recommended where the possibility exists that the rectifier-chargers may be left in equalize for an excessive time period.

b. The recharge efficiency of a battery is approximately 85 to 90 percent. For every ampere hour (Ah) discharged, 1.1 to 1.15 Ah must be returned to the battery by the charger. (One Ah is the flow of one ampere of current for one hour. In general, the number of Ah is the product of amperes and hours.) In addition, recharge time for the main battery varies with the factors below:

- (1) Number of rectifier-chargers operational.
- (2) Size of battery bank in Ah.
- (3) Load current.
- (4) Rectifier-charger output voltage.
- (5) Age of battery bank.
- (6) Output current limit setting of rectifier-chargers.
- (7) Altitude and ambient temperature.

c. Altitude and temperature are factors in recharge time only at high temperatures. The rectifier-chargers in this SEIP can be operated at full rated output up to 122° F (50° C) at sea level and up to 104° F (40° C) at 10,000 feet in elevation. Derating of rectifier-chargers may be necessary at elevated stations at high temperatures.

d. End cell recharge time depends primarily on the end cell rectifier-charger current rating, Ah rating of the end cells, and output voltage of the end cell rectifier-charger. A longer recharge time is acceptable for end cells, since use of the end cells is required less frequently than the main cells when this type of battery configuration is utilized.

1.5.11 Distribution Considerations.

1.5.11.1 Fuses and Circuit Breakers. Fuse or circuit breaker panels should be tailored for each specific application. Fuses are fast acting. When overloaded to 10 times their normal rating, they open the circuit in about 0.1 second. Circuit breakers require 0.7 to 2 seconds under the same conditions. Circuit breakers have the advantage of quick resettability. If the distribution network uses circuit breakers for individual equipment items and fuses for main or branch protection, it is possible for a short circuit to blow a branch fuse before the equipment circuit breaker can open. To minimize this possibility the equipment circuit breaker ratings must be close to the actual individual load and significantly smaller than the branch circuit fusing.

1.5.11.2 Distribution Configurations.

a. If the communications equipment is located nearby (not more than about 80 feet away), the fuse panels may be rack-mounted with the dc power equipment. This arrangement is referred to as local distribution.

b. For longer distances and modest power requirements, a wall-mounted circuit breaker panel can be located near the loads. Several panels can be used. This method is especially suitable if there is a shortage of floor space.

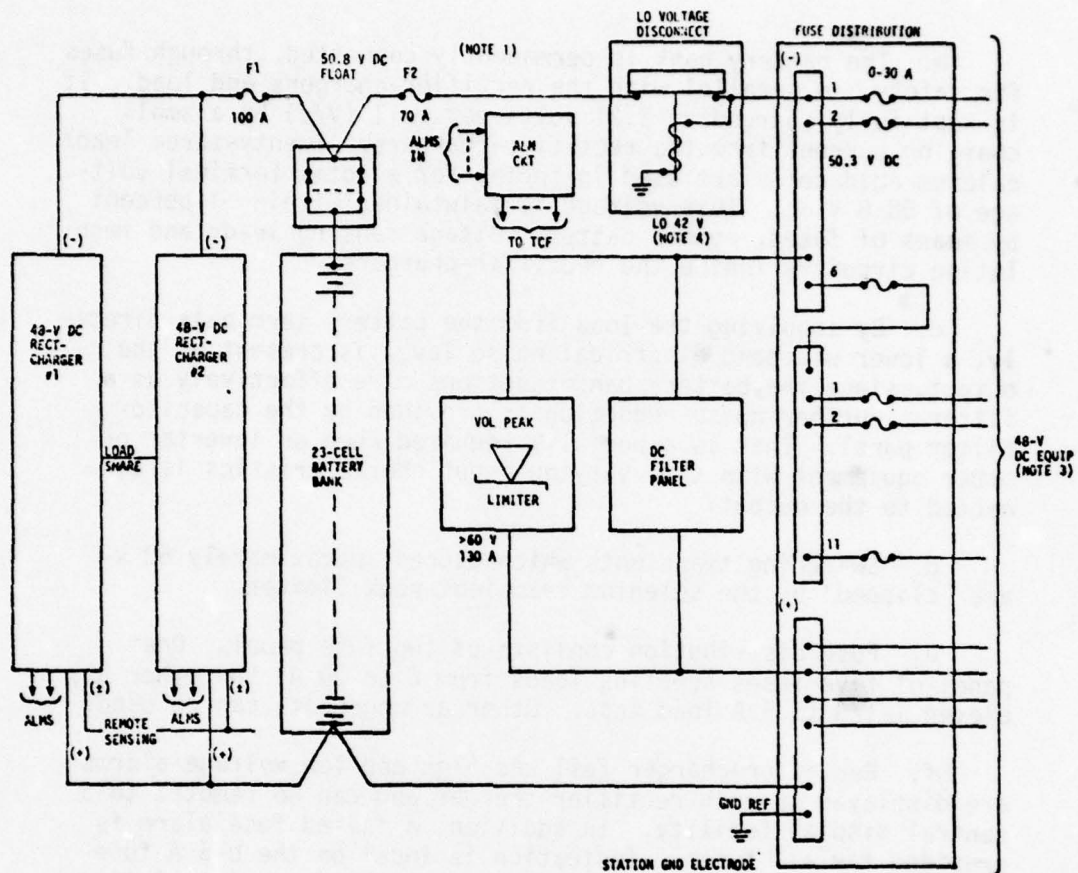
c. A separate fuse distribution cabinet is recommended for large distribution requirements in separate locations over 80 feet away. The distribution cabinet should be located near the communications equipment.

d. Schematics of the three types of distribution systems are included in section 4.

1.6 DESCRIPTION OF OPERATION.

1.6.1 50-A Basic Battery Facility.

a. During normal operation (primary ac power "on"), the 48-V dc load is supplied from the redundant pair of 50-A rectifier-chargers. These are in a load-sharing arrangement. Each supplies approximately one-half of the total load. In case of failure of either rectifier-charger, the other assumes the total load automatically. Refer to figure 1-6.



NOTES:

1. CONTINUOUS CAPACITY OF THIS FACILITY IS 50 A. PEAK CAPACITY FOR UP TO 1 HOUR IS 70 A. (IF ONLY ONE RECTIFIER-CHARGER IS OPERATIONAL, THE BATTERY BANK SUPPLIES THE ADDITIONAL CURRENT.)
2. BATTERY SIZE IS DETERMINED BY THE REQUIRED TIME ON BATTERY POWER.
3. WIDEBAND ELECTRICAL NOISE IS LIMITED TO 200 mV p-p. FUSE DISTRIBUTION CAN VARY TO SUIT THE APPLICATION.
4. FOR UNMANNED SITES.

Figure 1-6. 48-V Dc, 50-A Basic Battery Facility Diagram.

b. The battery bank is permanently connected, through fuses for safety, in parallel with the rectifier-chargers and load. It is kept fully charged at 2.21 volts per cell (V/c) by a small charging current from the rectifier-chargers. Twenty-three lead/calcium-acid cells are used in series for a total terminal voltage of 50.8 V dc. This voltage is maintained within ± 1 percent by means of fused, remote battery voltage sensing leads and regulating circuitry inside the rectifier-chargers.

c. By supplying the load from the battery terminals directly, a lower wideband electrical noise level is present at the output, since the battery bank functions more effectively as a filter. Further noise reduction is provided by the capacitor filter panel. This is especially required when an inverter or other equipment with time varying input characteristics is connected to the output.

d. Switching transients which exceed approximately 60 V are "clipped" by the selenium transient peak limiter.

e. Fuse distribution consists of two fuse panels. One panel of five fuses supplies loads from 6 to 30 A; the other has eleven 1-1/3 to 5 A load taps. Other arrangements can be used.

f. Rectifier-charger fail and high and low voltage alarms are displayed on each rectifier-charger and can be remoted to a central display facility. In addition, a failed fuse alarm is provided for all fuses. Indication is local on the 0-5 A fuse panel. An extra set of contacts is available for remote indication.

g. In case of an ac primary power failure, the battery bank maintains uninterrupted power to the loads for a specified period of time. Battery banks with full load capacities of 1, 4, and 8 hours are included in section 4 of this SEIP. Selection criteria for operating time on battery power are presented in paragraph 1.5.9.

h. As the battery bank discharges, the terminal voltage falls. In calculating required battery size for a specified duration of battery operation after an ac power failure, a cutoff potential of 45.5 V at the battery terminals is chosen. Some equipment begins to malfunction when voltage drops to 44 V. Hence, the cutoff of 45.5 V at the battery terminals allows a drop of 1.5 V in connecting wires and filters, if any, between the battery bank and equipment. If the total loss cannot be limited to 1.5 V, because of economic or other reasons, a 24-cell battery bank with counterelectromotive force (CEMF) cell is recommended. See paragraph 1.6.2.

i. Discharge would continue after the low voltage point has been reached if ac power were not restored. To prevent unnecessary discharge of the battery bank at unmanned sites, inclusion of a low voltage cut off relay is recommended. (At manned sites the load can be removed manually by pulling the discharge fuse.)

j. Upon restoration of primary or backup ac power, both rectifier-chargers conduct fully (current limited at 100 percent) to supply the load and simultaneously recharge the battery bank. If only one rectifier-charger is operational, recharge takes longer, since only the difference between the full rating and the actual load current is available for charging. (The current limit adjustment is factory set at 100 percent. It can be re-adjusted to any value between 90 and 125 percent.)

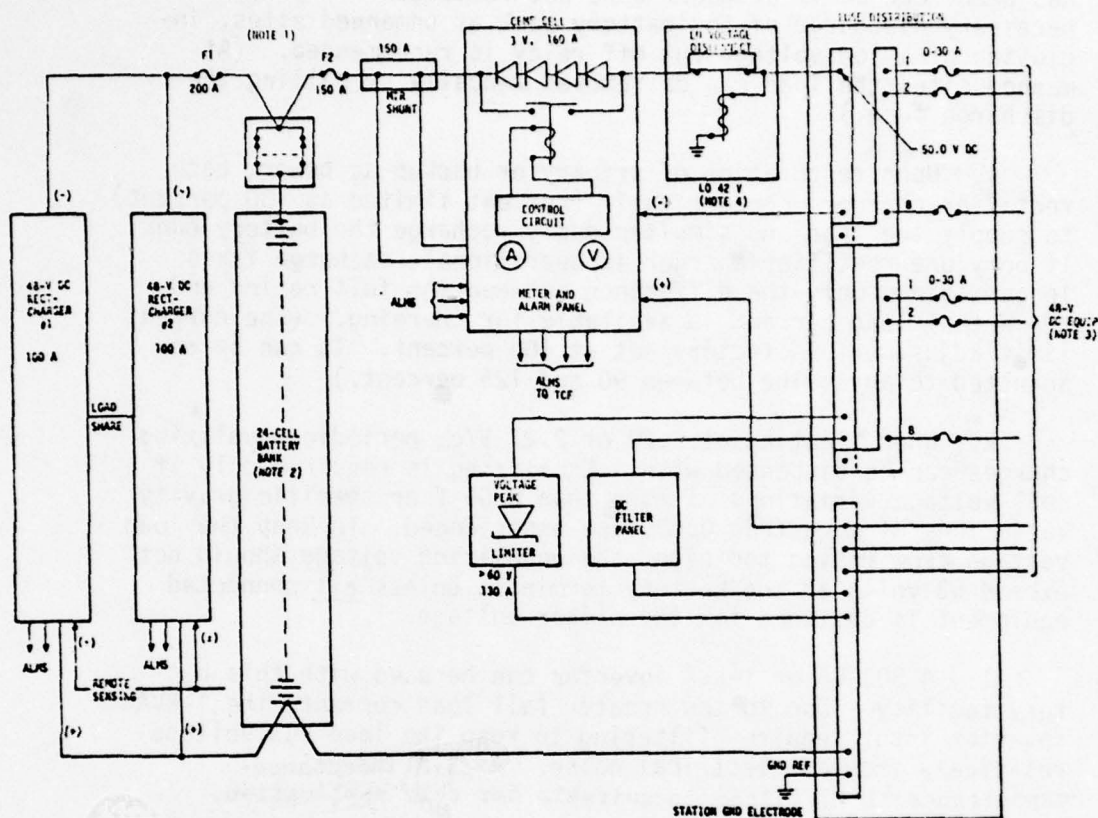
k. When floating at 2.20 or 2.21 V/c, periodic equalizing charges can be dispensed with. Equalizing is required only if cell voltage variations of more than 0.05 V or specific gravity variations of more than 0.005 are experienced. To keep the load voltage from rising too high, the equalizing voltage should not exceed 53 volts at the battery terminals unless all connected equipment is designed for the higher voltage.

l. A 500-VA or 1-kVA inverter can be used with this battery facility. Due to the greater full load current, the 1-kVA inverter input requires filtering to keep the load bus voltage relatively free of electrical noise. A 25-A inductance-capacitance (L-C) filter is suitable for this application.

m. Basic battery facilities using 24 cells in the battery bank can also be used. In this case, all connected equipment must be capable of operation for a certain time period (up to 24 hours) at voltages up to 55 volts. This is necessary for the infrequent equalize charges. When 24 cells are used, discharge is deeper, allowing the use of a smaller battery bank. Also, if a cell becomes defective, it can be removed and the space bridged with copper wire or straps for operation with 23 cells. The rectifier-chargers must be readjusted for a battery terminal voltage of 50.8 V.

1.6.2 100-A CEMF Cell Battery Facility.

a. By providing a voltage dropping element (dry CEMF cell) in the lead to the load, 24 cells can be floated at the proper voltage and still keep the load voltage below 52 V, even during equalization. As stated earlier, a 24-cell battery permits deeper discharge of the cells, resulting in a smaller Ah requirement. A block diagram of the selected configuration is included as figure 1-7.



NOTES:

1. CONTINUOUS CAPACITY OF THIS FACILITY IS 100 A. PEAK CAPACITY FOR UP TO 1/2 HOUR IS 150 A.
2. BATTERY SIZE IS DETERMINED BY THE REQUIRED TIME ON BATTERY POWER.
3. WIDEBAND ELECTRICAL NOISE IS LIMITED TO ≤ 200 mV p-p. FUSE DISTRIBUTION MAY VARY TO SUIT THE APPLICATION.
4. FOR UNMANNED SITES.

Figure 1-7. 48-V Dc, 100-A CEMF Cell Battery Facility Diagram.

b. A CEMF cell made up of silicon diodes in a series-parallel arrangement, mounted on metal plates for heat sinking, provides a nearly constant voltage drop on the load side of the battery bank of 2.7 to 3.0 V in the forward direction. The 24 lead/calcium-acid cell string is floated at 2.20 or 2.21 V/c for a total terminal voltage of 52.8-53.0 V. The load voltage is approximately 3 volts less, or 50 V. When the battery bank discharges during an ac power failure to 47.5 V dc, a solid-state voltage sensing circuit and electromechanical contactor short out the CEMF cell. This raises the load voltage to approximately 50 V again. Discharge then continues until either ac power is restored or the voltage falls below the value required for the load. At this point the load should be removed by pulling the discharge fuse to prevent further discharge. At unmanned sites, an automatic low voltage disconnect relay can be installed.

c. As with the basic battery facility, two 48-V dc rectifier-chargers are used. In this case each unit is rated at 100 A. Remote battery voltage sensing, 4-conductor wiring, additional filtering, and transient peak limiting are incorporated.

d. Fuse distribution consists of local fuse panels in most cases. A wall-mounted circuit breaker panel is also presented. This method of distribution is useful where the major loads are grouped some distance (75-150 feet) away from the dc power facility. Additional fuse distribution can be provided in selected equipment cabinets. Various in-cabinet fuse panels and blocks are included in this SEIP.

e. Battery bank sizes for full load capacities of 1, 4, and 8 hours are included in section 4 of this SEIP. The selection criteria for operating time on battery power presented in paragraph 1.5.9 apply.

f. Upon restoration of ac power, the load voltage rises almost immediately to the normal float voltage value since both rectifier-chargers are operating at full capacity. When 51.5 V are present at the load bars, the CEMF cell control circuit opens the shorting contactor, placing the cell again in series with the load. The load voltage drops to 48.5 V momentarily, but rises as the battery bank reaches the normal float voltage.

g. Equalize charges at 2.30 V/c, or 55.2 V for the 24-cell battery bank, are necessary only if cell variations exist as stated in paragraph 1.6.1k.

h. Inverters up to 2 kVA can be used with this larger facility. One- and 2-kVA inverters require L-C filters in the input to maintain low wideband electrical noise for the communications equipment distribution. A 50-A L-C filter is suitable for both inverters.

1.6.3 200-A CEMF Cell Battery Facility.

a. The 200-A CEMF cell battery facility is identical in operation to the 100-A CEMF cell facility described in paragraph 1.6.2. Two rectifier-chargers of 200-A capacity are used as well as 200-A CEMF cell for the greater capacity. Battery banks are also correspondingly larger. A simplified schematic diagram of the 200-A CEMF cell facility is included as figure 1-8.

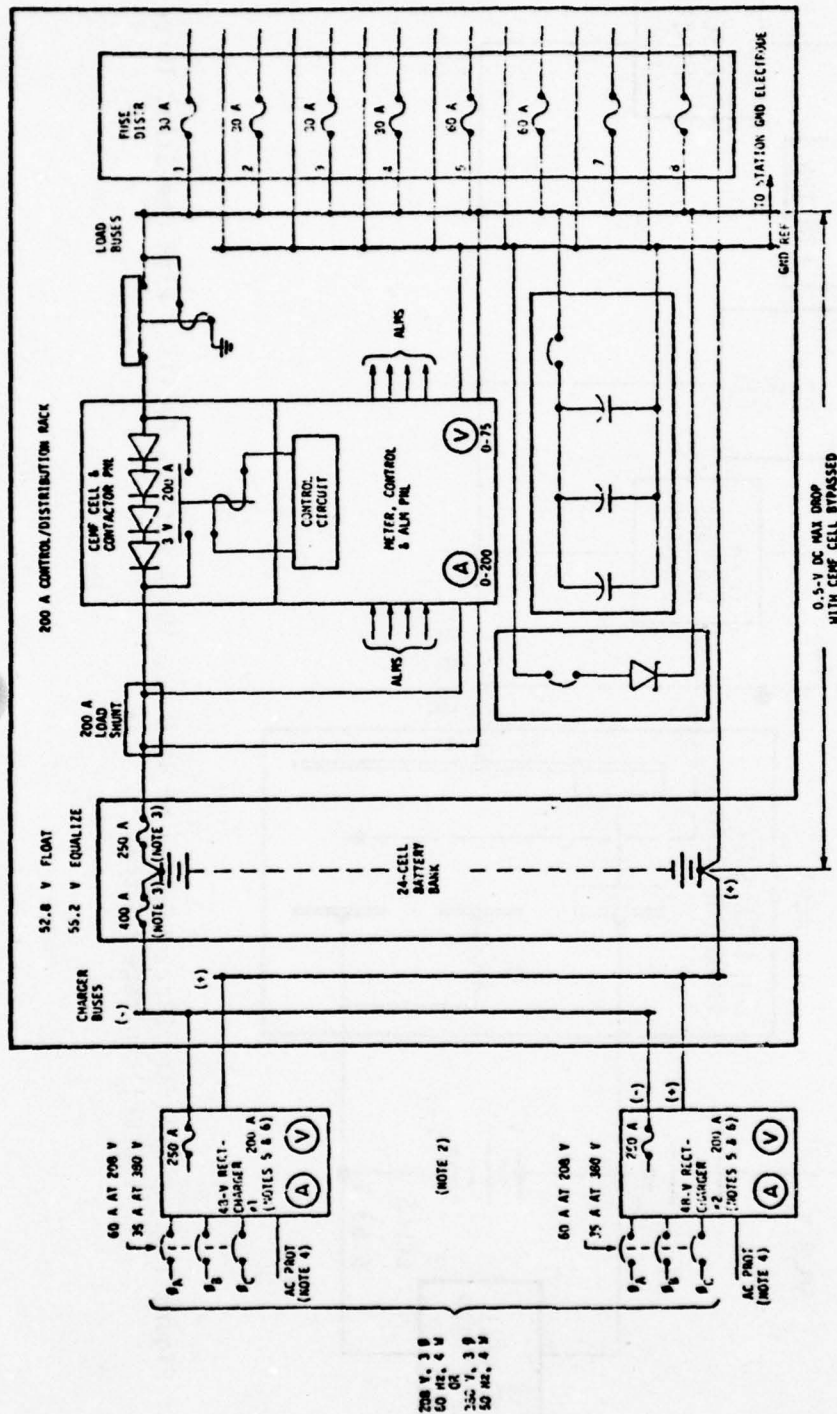
b. In addition to the local fuse and wall-mounted circuit breaker distribution methods, a remote cabinet distribution arrangement is included. The remote cabinet distribution method is most useful where the battery facility and communications equipment are separated by a considerable distance (100-300 ft) on the same floor or are located at different levels. The remote fuse distribution cabinet contains not only the fuse panels but, also, interconnect bars, a volt and ammeter panel, additional filtering and transient suppression, and mounting space for dc-dc converters or an inverter of 500-VA output. Larger inverters should be located in the dc equipment room.

c. Inverters up to 5 kVA can be used with the 200-A facility. When a 5-kVA inverter is used, the communications load is generally filtered instead of the inverter input, for low wideband noise to the more sensitive equipment. See the applicable inverter wiring drawing in section 4.

1.6.4 400-A End Cell Battery Facility.

a. Three 200-A rectifier-chargers are used in parallel to provide the 400-A capacity with one-for-two sparing. This has the advantage over two 400-A units in that no new rectifier-chargers are introduced. The 200-A units can also be handled easier. Two 400-A units can be used if desired. The cost of two 400-A units is slightly less, but each 400-A unit is considerably larger (floor model) and heavier.

b. The circuit arrangement for the selected end cell facility is shown in figure 1-9. The three main rectifier-chargers are connected directly across the load at all times.



NOTES:

1. CONTINUOUS CAPACITY IS 200 A. PEAK CAPACITY FOR UP TO 1/4 HOUR IS 250 A BELOW 30°C AMBIENT AIR TEMPERATURE.
2. INSTALL RECTIFIER-CHARGERS AND CONTROL/DISTRIBUTION RACK IN SEPARATE AREA CLOSE TO BATTERY.
3. LOCATE PULL-OUT, ENCLOSED FUSES JUST OUTSIDE BATTERY ROOM, NEAR DOOR OR IN CONTROL/DISTRIBUTION RACK.
4. DO NOT CONNECT TO OVERHEAD (SIGNAL) GROUND OR ALLOW METAL CONTACT TO SIGNAL GROUND.
5. THE RECTIFIER-CHARGERS ARE FILTERED FOR RIPPLE AND WIDEBAND NOISE TO 200 mV p-p WITH BATTERY BANK CONNECTED AND A RESISTIVE LOAD.
6. AUTOMATIC CURRENT LIMITING WITHOUT SHUTDOWN IS FACTORY ADJUSTED AT 100%.

Figure 1-8. 48 V Dc, 200-A Battery Facility With CEMF Cell Load Voltage Control.

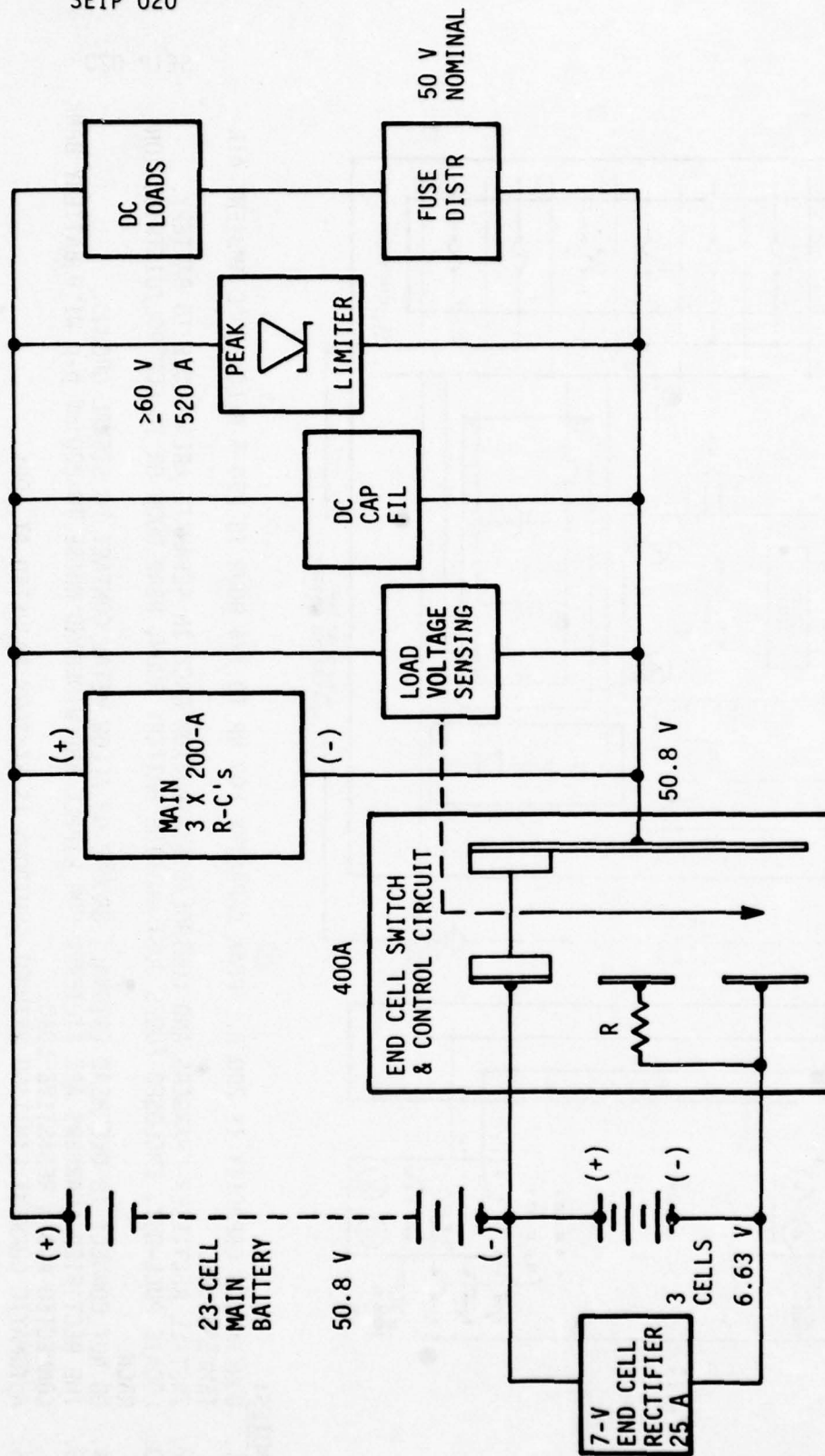


Figure 1-9. Simplified Block Diagram of 48-V Dc, 400-A Battery Facility With One-Step, Three-Cell End Cell Voltage Control.

During normal operation, the load current flows directly from the rectifier-chargers to the load without passing through the end-cell switch, thereby substantially reducing the duty cycle of this switch and virtually eliminating the possibility of contact problems. The load voltage is maintained at 50.6-50.8 V dc with an accuracy of ± 1 percent.

c. During normal operation, the main rectifier-chargers are also connected directly across the 23-cell main battery string through the end cell switch, thereby maintaining the 23 cells at a floating voltage of 2.20-2.21 V/cell or 50.6-50.8 V dc for the 23 cells.

d. The remaining 3 cells of the 26-cell battery bank are kept fully charged by means of a separate end cell rectifier-charger. This unit is also adjusted for a float voltage of 2.20-2.21 V/c, for a terminal voltage of 6.60-6.63 with an accuracy of ± 1 percent.

e. Additional dc filtering is provided to reduce the residual wideband noise to below 200 mVp-p. The combination of filters not only attenuates noise in the voice frequency band, but is effective throughout the wideband noise spectrum from dc to 25 MHz.

f. In case of an ac power outage, or if the load exceeds the capacity of the rectifier-chargers, current will be drawn from the 23-cell battery. This reduces the voltage appearing across the load. This voltage drop is detected by a solid-state load voltage sensing unit. The load voltage sensing unit is normally adjusted to operate at 46 volts. It automatically actuates the end cell switch and transfers the load from 23 cells to 26 cells without interruption.

g. Upon restoration of full ac power, all rectifier-chargers deliver maximum output current. The voltage sensing leads of the main rectifier-chargers are connected directly to the 23-cell battery which, at this time, is in a partially discharged condition. The main rectifier-chargers begin to recharge the 23-cell battery string while simultaneously supplying the load current. The end cell rectifier-charger recharges the three end cells. The load voltage rises to and remains at 50.6-50.8 V dc, ± 1 percent, shortly after ac power is restored.

h. For very fast recharge at continuous maximum current from all rectifier-chargers, or for equalizing (higher than normal voltage), the main and end cell rectifier-chargers can

be switched to the equalize position for an output voltage up to 54 V dc for the 23-cell battery. The end cell equalize voltage should be set at 7 V dc for the three end cells. Under normal conditions, it is no longer necessary to equalize lead/calcium-acid batteries at excessive voltages. The new rectifier-chargers maintain the float voltage within such narrow tolerances that the old practice of periodic equalizing charges can be eliminated with a consequent saving in maintenance.

i. Inverters up to 10 kVA can be used with this battery facility.

1.6.5. Recharge Times. The approximate time required to recharge the selected main battery banks for the listed ampere hour discharges is given in tables 1-3 and 1-4.

Table 1-3. Approximate Recharge Times for Selected 50-A, 100-A, and 200-A Battery Facilities

Nominal operating time on battery, hours	Ah* removed from 100-A facility	Time to recharge, hours			
		Two R-C's operational		One R-C operational	
		50% load	75% load	50% load	80% load
1	50	1.7	2.1	5.2	13
4	200	6.9	8.3	20.8	52
8	400	13.9	16.6	41.6	104

*Multiply values in column by 2 for a 200-A facility;
divide by 2 for a 50-A facility

Table 1-4. Approximate Recharge Times for
Selected 400-A Battery Facility

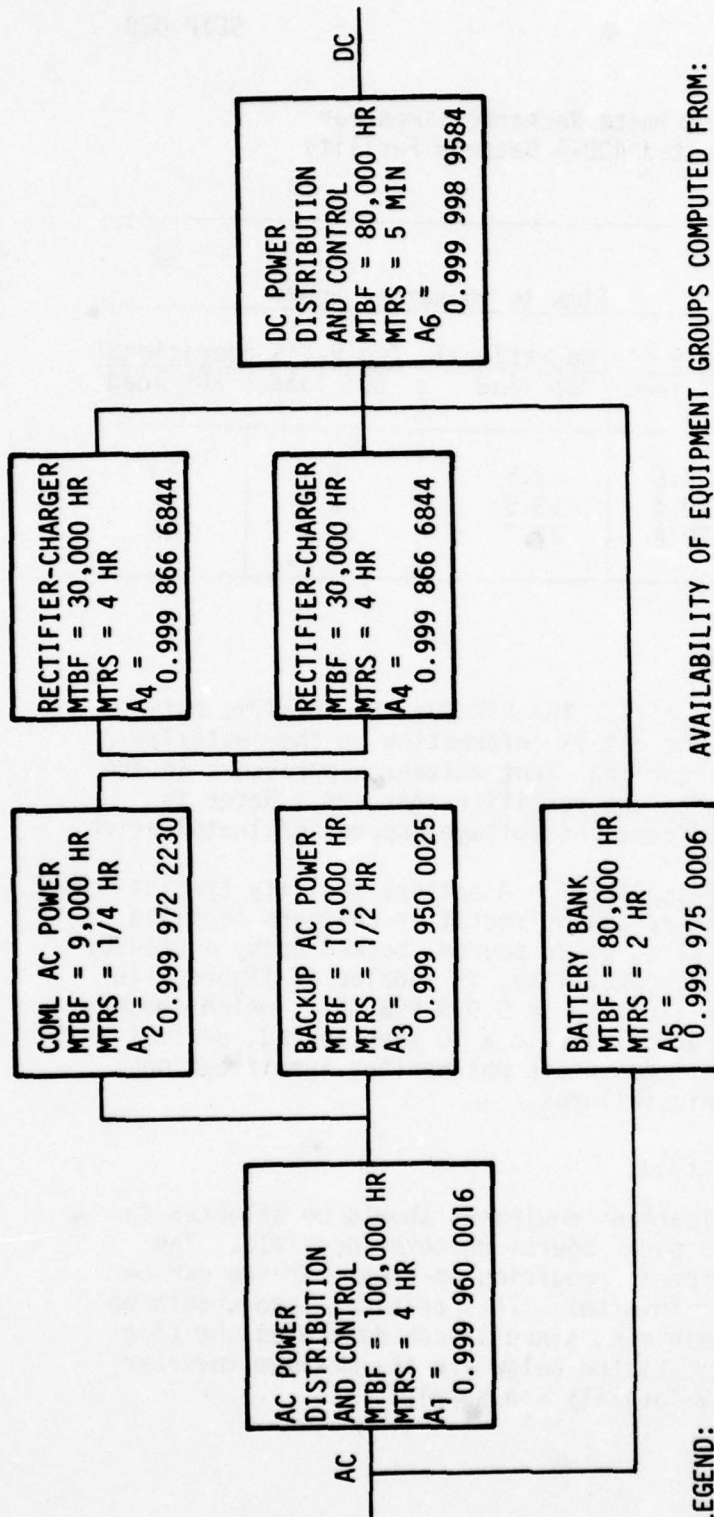
Nominal operating time on battery, hours	Ah removed from battery	Time to recharge, hours			
		Three R-C's operational		Two R-C's operational	
		50% load	75% load	50% load	80% load
1	400	2.6	3.5	5.2	13
4	1,600	10.4	13.9	20.8	52
8	3,200	20.8	27.7	41.6	104

1.7 PROTECTION OF AC CIRCUITS. The EIP for the specific battery facility shall include detail information on the installation of metal oxide varistor transient voltage suppressors in the ac power panel which powers the rectifier-chargers. Refer to USACEEIA Pamphlet 105-9, Transient Voltage Suppressor Installation.

1.8 BATTERY FACILITY AVAILABILITY. A battery facility consisting of a battery bank and redundant rectifier-chargers supplied from a reliable commercial ac power source, backed up by a standby ac generator of average dependability, is modeled in figure 1-10. The expected overall availability is 0.999 998 9577, which amounts to only 5.5 minutes of outage time in a 10 year period, exclusive of mistakes in operation, components not meeting specifications, accidents, or catastrophic failures.

1.9 INVERTER CONSIDERATIONS.

1.9.1 General. Communications equipment should be selected for operation from a 48-V dc power source whenever possible. The residual ac-powered equipment requiring no-break service can be supplied from a dc-to-ac inverter. This critical load should be kept to an absolute minimum, since it can determine the size of the battery facility. Listed below are the maximum inverter sizes which each battery facility can supply:

LEGEND:

A
A₁, A₂
A₃, etc.
A_T
MTBF
MTRS

AVAILABILITY
AVAILABILITY OF EQUIPMENT GROUP

TOTAL AVAILABILITY
MEAN TIME BETWEEN FAILURES
MEAN TIME TO RESTORE SERVICE

AVAILABILITY OF EQUIPMENT GROUPS COMPUTED FROM:

$$A_N = \frac{MTBF}{MTBF + MTRS}$$

$$A_T = 0.999\ 998\ 9577$$

THIS AMOUNTS TO AN OUTAGE OVER
A 10 YEAR PERIOD OF 5.5 MINUTES.

Figure 1-10. Availability Model for a Complete Battery Facility.

Battery facility capacity, A	Inverter output rating, kVA	Full-load input current, A	Available dc to 48-V loads, A
50	1	26.2	23.8
100	2	51.0	49.0
200	5	124	76
400	10	243/252*	157/148*

*Currents for 60/50 Hz.

1.9.2 Configuration. A single inverter with internal automatic electromechanical transfer relay is recommended for most applications. If the infrequent 60-millisecond transfer time to commercial power cannot be tolerated, a solid state switch is required. These are expensive and generally not as reliable. An external bypass switch should be included in each inverter installation to permit removal of the inverter for maintenance without more than a momentary power interruption. An inverter installation wiring diagram is included as figure 1-11.

1.9.3 Location. The 500-VA inverter, small dc-to-dc converters, and power supplies can be installed in the fuse distribution cabinet, if used, or located in the dc equipment room. Larger inverters and converters, and power supplies over 1 kVA should be installed in the dc equipment room to minimize electrical noise conduction to communications equipment.

1.9.4 Input Line Filtering. In general, supplementary dc line filtering is not required for the small (500-VA) inverter. L-C line filters are usually required for the 1- and 2-kVA inverters in order to maintain wideband and impulse noise at the common 48-V supply point below 200 mVp-p. When the 5- and 10-kVA inverters are used, it is preferable to filter the supply lines to the communications equipment and allow the common 48-V supply point to be electrically noisy.

1.9.5 Output Power Factor Correction. When the inverter ac load has a power factor (pf) below 0.8 and just exceeds the capacity of the inverter at that power factor, power factor correction capacitors can be connected to the output to raise the output capability of the inverter to, or near to, the maximum VA rating. The method of connection is shown in figure 1-12. The steps in choosing the correction capacitor are illustrated by an example.

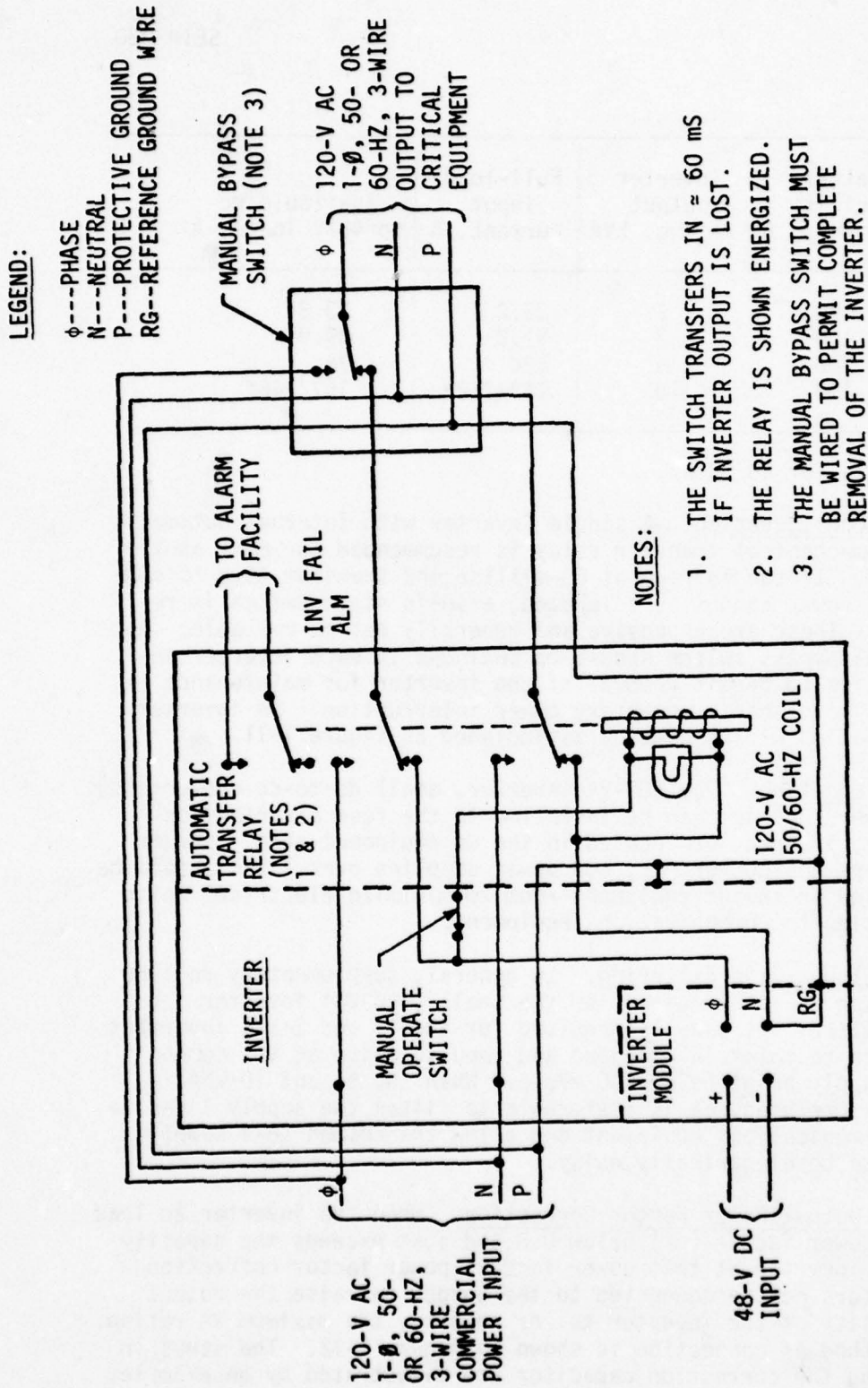
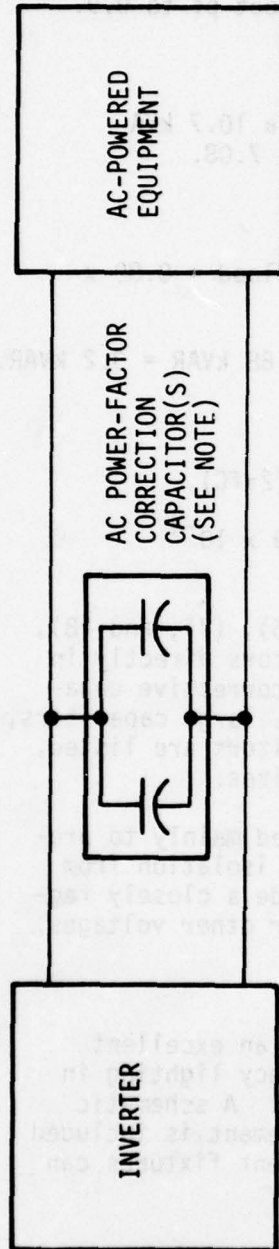


Figure 1-11. Inverter Transfer and Manual Bypass Diagram.



NOTE: THE POWER-FACTOR CORRECTION CAPACITORS CAN ALSO BE INSTALLED AT THE LOAD END.

Figure 1-12. Inverter Output Power Factor Correction for Greater Inverter Output Capability.

a. Given: 10-kVA inverter, 8-kW load at 0.75 pf, inductive.

b. Determine: capacitance required to correct pf to 0.9.

(1) At a pf of 0.75, 8 kW = 10.7 kVA.

(2) KVA reactive (kVAR) at 0.75 pf for a 10.7 kVA load = $10.7 \times \sin(\arccos 0.75) = 10.7 \times 0.6614 = 7.08$.

(3) At a pf of 0.9, 8 kW = 8.89 kVA.

(4) KVAR at a pf of 0.9 for a 8.89 kVA load = $8.89 \times \sin(\arccos 0.9) = 8.89 \times 0.4359 = 3.88$.

(5) Required capacitor = 7.08 kVAR - 3.88 kVAR = 3.2 kVAR.

(6) VAR = 3200 = V^2/Z .

(7) $Z = V^2/3200 = 120^2/3200 = 4.5 = 1/(2\pi fC)$.

(8) $C = 1/(2\pi fZ) = 1/2\pi(60)(4.5) = 5.89 \times 10^{-4}$
F = 589 μ F.

It is sometimes not necessary to perform steps (6), (7), and (8), since manufacturers rate large corrective capacitors directly in kVAR. Table 1-5 lists characteristics of small corrective capacitors, rated in capacitance, and table 1-6 lists large capacitors, rated in kVAR. Although only single-phase capacitors are listed, three-phase capacitors are available in larger sizes.

1.10 DC-DC CONVERTERS. Dc-dc converters are used mainly to provide other dc voltages, reversal of polarity, or isolation from a battery plant. They can also be used to provide a closely regulated output voltage at the battery facility, or other voltages.

1.11 AUTOMATIC EMERGENCY LIGHTING.

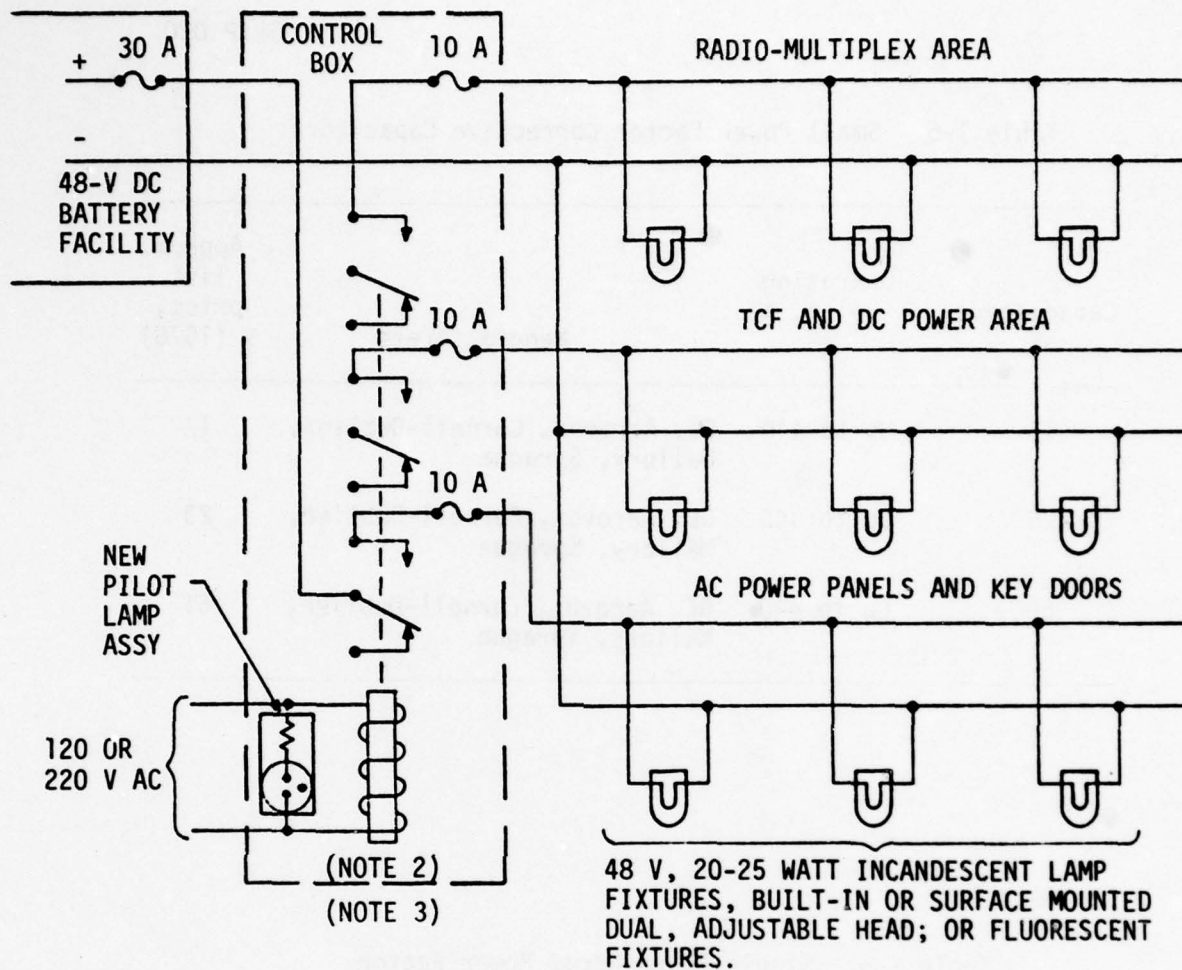
a. An adequate 48-V dc battery facility is an excellent source of power for economical, automatic emergency lighting in a communications station during ac power failure. A schematic diagram of a suggested emergency lighting arrangement is included as figure 1-13. Either incandescent or fluorescent fixtures can be used.

Table 1-5. Small Power Factor Corrective Capacitors.

Capacitance μF	Operating volts, ac rms	Manufacturers	Approx. list price, \$ (1978)
15	Up to 440	GE, Aerovox, Cornell-Dublier, Mallory, Sprague	17
25	Up to 440	GE, Aerovox, Cornell-Dublier, Mallory, Sprague	23
50	Up to 440	GE, Aerovox, Cornell-Dublier, Mallory, Sprague	51

Table 1-6. Single-Phase Large Power Factor Corrective Capacitors.

KVAR at 120 V ac	KVAR at 240 V ac	GE part no.	List price, \$ (1976)
0.63	2.5	55F331AD	176
1.25	5	55F332AD	234
1.88	7.5	55F333AD	273
2.50	10	55F334AD	305
3.75	15	55F335AD	363
5.00	20	55F336AD	456
6.25	25	55F337AD	558

**NOTES:**

1. THIS LIGHTING PLAN IS APPLICABLE TO ALL SITES WITH AN ADEQUATE 48-V BATTERY FACILITY.
2. THE RELAY IS NORMALLY ENERGIZED AND DROPS OUT WHEN AC POWER FAILS.
3. THE CONTROL BOX (EXCEPT FOR FUSING) CAN BE OMITTED WITH FLUORESCENT FIXTURES.
4. FUSE SIZES WITH FLUORESCENT FIXTURES CAN BE ONE-HALF THAT SHOWN.

Figure 1-13. Emergency Lighting Operating From the Station 48-V Dc Battery Facility.

b. Incandescent units can be built-in or surface-mounted dual units with adjustable heads using 20- to 25-watt, 48- to 50-V bulbs.

c. Suitable fluorescent fixtures are Lorain Model PFA400B1 (open) and PFA400B2 (enclosed). Each fixture operates over a range of 40 to 60 V dc and draws 0.70 A at 50 V dc. The fluorescent type lamps can be configured so as to operate from the battery bank continuously. This arrangement adds little additional load to the rectifier-chargers, eliminates the need for the control box shown on figure 1-13, and provides continuous testing.

1.12 APPLICABLE DOCUMENTS.

a. Government documents.

CCR 702-1-2	USACC Quality Assurance Program for Engineering, Installation and Acceptance of Communications-Electronic Equipment and Systems
CCR 385-1	Communications Mission Safety
CCCR 34-2	Preparation of Engineering Installation Packages and Standard Engineering Installation Packages
CCCP 105-9	Transient Voltage Suppressor Installation
DCAC 370-160-3	Site Survey Data Book for Communication Facilities
Air Force Technical Order (T.O.) 31-10 Series	Standard Installation Practices
USACEEIA Drawing STD-MS-0003	Capacitor Filter Panel Fabrication
USACEEIA Drawing STD-MS-0023	60-V Dc, 130 to 520-A Transient Peak Limiter Panel Fabrication

SEIP 020

b. Non-Government documents.

NFPA No. 70-1978

National Electrical Code,
1978 edition; published
by National Fire Protec-
tion Association

Battery Manual

Manufacturer

Rectifier-Charger Manual

Manufacturer

1.13 COMMENTS ON PUBLICATION.

a. Users of this publication are invited to submit recommendations for its improvement. Comments should be keyed to drawing, page, paragraph, and line of the text for which the change is recommended. A mailing card for convenience is bound with this SEIP. Comments should be sent directly to the Commander, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP, Fort Huachuca, Arizona 85613.

b. Requests for USACEEIA regulations and forms should be addressed to the Commander, USACEEIA, ATTN: CCC-SPT-RM, Fort Huachuca, Arizona 85613.

SECTION 2. SITE SURVEY AND DATA CHECKLIST

2.1 SITE SURVEY CRITERIA. A site survey is required for each installation. The survey shall be conducted in accordance with applicable portions of CCCR 34-2, Preparation of Engineering Installation Packages and Standard Engineering Installation Packages, and criteria set forth in DCAC 370-160-3, Site Survey Data Book for Communication Facilities.

2.2 DATA TO BE OBTAINED. Minimum data to be obtained during the survey are listed below:

- a. Accurate, dimensioned floor plan of all areas affected
- b. Rack and cabinet layouts of all equipment to be interfaced
- c. Data for a cable ladder and/or duct and conduit layout
- d. Itemized list of equipment to be powered, number of each; and ac and dc power requirements of each
- e. Ac power panels and circuit breakers available and their locations
- f. Exact requirements for total no-break ac power
- g. Requirements for dc power at other than 48 V, such as 24 or 28 V dc.

2.3 SITE SUPPORT.

a. During the survey, arrangements should be made for the site support required prior to and during installation. Immediately after the survey, the project engineer will document agreements reached in the Project Coordination Letter (PCL). The project engineer is also responsible for updating the PCL if site support requirements change.

b. Special support requirements for a dc power facility include: a 20 to 50 gallon, plastic mixing container and a pump or siphon for battery acid, and a supply of distilled water.

SEIP 020

c. If arrangements can be made for these items to be furnished at the site, the agreement should be documented in the PCL. If they cannot be supplied as part of the site support, they must be included in the BOM of the EIP.

2.4 EQUIPMENT CHARACTERISTICS. The major items of electrical equipment to be installed and their characteristics are listed in table 2-1.

Table 2-1. Major Equipment Characteristics

Item	Number of units	Characteristics			
		50-A facility	100-A facility	200-A facility	400-A facility
Main rectifier-chargers	(See characteristics)	<p>2 Lorain Model RL50F50 120/208/240 V ac, 1 ϕ, 50/60 Hz, 15.8 AFL input @ 120 V ac, 48.3-58.8 V dc. 50-A output.</p> <p>Current limit adjustment 90 to 125%. (Factory set at 100%.) Filtered to 200 mVp-p when used with a 200 Ah or larger battery</p>	<p>2 Lorain Model RHM100D50 208/240 V ac, 3 ϕ, 60 Hz, 22.7 AFL input @ 208 V ac; 48.3-58.8 V dc 100-A output</p> <p>or</p> <p>2 RHM100C50 380/400/415 V ac, 3 ϕ, 50/60 Hz, 11.9 AFL input @ 380 V ac, 48.3-58.8 V dc 100-A output.</p> <p>Current limit adjustment 90 to 125%. Filtered to 200 mVp-p when used with a 400 Ah or larger battery.</p>	<p>2 Lorain Model RHM200D50 208/240 V ac, 3 ϕ, 60 Hz, 45.1 AFL input @ 208 V ac; 48.3-58.8 V dc 200-A output</p> <p>or</p> <p>2 RHM200C50 380/400/415 V ac, 3 ϕ, 50/60 Hz, 24 AFL input @ 380 V ac; 48.3-58.8 V dc 200-A output</p> <p>Current limit adjustment 90 to 125%. Filtered to 200 mVp-p when used with a 800 Ah or larger battery.</p>	<p>3 Lorain Model RHM200D50 or RHM200C50 (Same characteristics as 200-A facility at left)</p>

Table 2-1. Major Equipment Characteristics (Continued)

Item	Number of units	Characteristics			
		50-A facility	100-A facility	200-A facility	400-A facility
End cell rectifier-charger	1 or 2; used only with the 400 A facility (Note 2)				Lorain Model RJ25F7; 120/208/240 V ac, 1 ϕ , 50/60 Hz, 2.9 AFL @ 117 V ac input when set for 3 cells. Current limit adjustment 20 to 30 A (factory set at 27.5 A.) Filtered to 100 mVp-p when used with a 100 Ah or larger battery.
Power board	1	Lorain Model 1231A-List 1 modified	Lorain Model 1232F2-List 2 modified	Lorain Model 1232F2-List 3 modified	Lorain Model 1241A3-List 4 modified

Table 2-1. Major Equipment Characteristics (Continued)

Item	Number of units	Characteristics			
		50-A facility	100-A facility	200-A facility	400-A facility
Battery bank	1	23-cell, 48-V dc lead/calcium-acid C&D, Gould, or Exide 1 hr = 340 Ah 4 hr = 600 Ah 8 hr = 1000 Ah	24-cell, 48-V dc lead/calcium-acid C&D, Gould, or Exide 1 hr = 380 Ah 4 hr = 670 Ah 8 hr = 1000 Ah	24-cell, 48-V dc lead/calcium-acid C&D, Gould, or Exide 1 hr = 750 Ah 4 hr = 1350 Ah 8 hr = 1800 Ah	26-cell, 48-V dc lead/calcium-acid C&D, Gould, or Exide 1 hr = 900 Ah 4 hr = 1950 Ah 8 hr = 3260 Ah
Main power distribution	Various	Local fuse distribution 0-5 A 0-30 A	1. Local fuse distribution 0-30 A 31-60 A, or 2. Wall-mounted circuit breaker panel, 5 A-25 A	1. Local fuse distribution 0-30 A 31-60 A, or 2. Wall-mounted circuit breaker panel, 5 A-25 A, or 3. Remote fuse distribution cabinet; 0-5 A, 0-30 A, 31-60 A	(Same as for 200-A facility at left)

Table 2-1. Major Equipment Characteristics (Continued)

Item	Number of units	Characteristics			
		50-A facility	100-A facility	200-A facility	400-A facility
Local (cabinet) power distribution	Various	1. SB-1523/FT fuse panel; range of fuses 1-1/3 to 5 A 2. Type 70 fuse panel; 1-1/3 to 5 A fuses 3. Littlefuse fuse block, 2 A-15 A fuses 4. Buss fuse block 5. GMT fuse panel	(Same as 50-A facility)	(Same as 50-A facility)	(Same as 50-A facility)
Additional dc filters	(See characteristics)	Capacitor filter panel plus L-C filter for 1-kVA inverter, if used	Capacitor filter panel plus L-C filter for 1- or 2-kVA inverter, if used	Capacitor filter panel plus L-C filter for 1- or 2-kVA inverter, if used. 100-A L-C filters for the comm equip if 5-kVA inverter is used. Additional capacitor filter panel for remote cabinet distribution	Capacitor filter panel plus L-C filter for 1- or 2-kVA inverter, if used. 100-A L-C filters for the comm equip if 5- or 10-kVA inverter is used. Additional capacitor filter panel for remote cabinet distribution

Table 2-1. Major Equipment Characteristics (Continued)

Item	Number of units	Characteristics			
		50-A facility	100-A facility	200-A facility	400-A facility
Transient suppressor	(See characteristics)	One ≥ 60 V, 130 A	One ≥ 60 V, 130 A	One ≥ 60 V, 260 A. One additional > 60 V, 260 A For remote cabinet distribution if used	One ≥ 60 V, 520 A. One additional > 60 V, 260 A For remote cabinet distribution if used
Inverters	(See characteristics)	One 0.5 kVA or One 1.0 kVA 42-56 V dc in, 120 V ac, 1 ϕ , 60 Hz out	One 0.5 kVA or One 1 kVA or One 2 kVA 42-56 V dc in, 120 V ac, 1 ϕ , 60 Hz out	One 0.5 kVA or One 1 kVA or One 2 kVA or One 5 kVA 42-56 V dc in, 120 V ac, 1 ϕ , 60 Hz out	One 0.5 kVA or One 1 kVA or One 2 kVA or One 5 kVA or One 10 kVA 42-56 V dc in, 120 V ac, 1 ϕ , 50 or 60 Hz out
Load circuit breakers			5, 10, 15, 20, or 25-A with manual and magnetic trip, push button re-settable	Same as 100-A facility	Same as 100-A facility

NOTES:

1. FL = full load
2. Two 25-A end cell rectifier-chargers operating in parallel are recommended for the 8-hour battery bank and for overseas locations in remote areas.

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 INTRODUCTION. This section provides installation specifications and guidance for the installation of the four types of battery facilities.

3.2 GENERAL INSTRUCTIONS.

3.2.1 Adherence to Policies and Documents.

a. The equipment shall be installed in accordance with established policies, the engineering drawings and instructions, and referenced drawings and publications deemed necessary by the responsible engineering activity. Minor deviations from the EIP or SEIP may be made by the installation supervisor without prior approval by the project engineer. A minor change is one that does not--

- (1) Alter the specified floor plan or major item of equipment.
- (2) Violate a mandatory standard.
- (3) Alter the intended operational capability or procedures.
- (4) Alter the intent or end result of the required testing.

A major change is one which does alter or violate specifications listed in (1) through (4) above. The installation team shall not make major changes to the requirements and instructions contained in this specification without the prior approval of the project engineer. Requests for an approval of major changes may be made by telephone; however, a follow-up message or letter is required. All changes shall be documented (redlined) by the team chief and the document which authorized the change shall be included in the documentation. Two sets of redlined documents are required. One set shall be left on site.

b. Installation personnel must be familiar with applicable technical order AFTO 31-10 series, Standard Installation Practices, to ensure that the facility is installed in accordance with standard practices.

c. Prior to start of installation, all team members should review the safety instructions in CCR 385-1 and in the installation and operating instruction manuals furnished by the rectifier-charger and battery manufacturers.

3.2.2 Changes in Scope. The installation team shall not accomplish work requested by local post, camp, or station personnel, unless such work is covered by the EIP or other agreements.

3.2.3 General Installation Precautions. The installation team chief will ensure that all safety regulations and proper accident prevention regulations are observed by all members of his team during all phases of installation. He must contact the responsible accident clinic prior to start of work to ensure quick medical treatment in case of emergency. To help prevent injuries to personnel and damage to batteries and equipment, the following safety regulations should be observed.

a. Installation personnel should be trained in safety practices pertinent to their duties and in the application of emergency first aid, rescue, resuscitation, and closed-chest heart massage.

b. Approved insulated tools, in good condition, should be used for electrical work. Tools with friction- or rubber-tape-covered handles should be avoided.

c. With the exception of test equipment, metallic measuring rules or metal-cased objects should not be used near energized electrical circuits. Personnel shall not wear metallic objects such as rings, identification tags, medals, wrist watches, or bracelets while working on or near electrical equipment.

d. Batteries can be cleaned by wiping with a cloth slightly moistened with water to minimize static electricity. Normally, synthetic materials (such as nylon or dacron) or wool should not be used.

e. If static electricity has been noticed, before inserting a thermometer or hydrometer into a cell or when adding water, the instrument or hand should touch an intercell connector or terminal on a cell to preclude a static electricity induced spark.

f. Batteries should be exposed to an open flame or sparks. The space between the cell cover and the top of the electrolyte in the cell usually contains an explosive mixture of hydrogen and oxygen.

g. Approved rubber gloves, aprons, sleeves, and safety goggles shall be used when handling battery electrolyte.

h. When mixing electrolyte, always add the acid to the water.

i. If electrolyte comes in contact with the skin, first flush with water and then get medical attention promptly. If electrolyte gets into the eyes, flush with water for at least 15 minutes and get medical attention as soon as possible.

j. When acid is spilled on the floor, apply neutralizer, such as baking soda, and clean the area promptly.

k. Do not open or close electrical connections in the battery room while the circuit is under load, as arcing may cause explosion.

l. Keep the exhaust fan switched on while working in the battery room. Ventilation reduces dangerous gas volume in the air.

3.3 INSTALLATION SPECIFICATIONS.

3.3.1 Description of Equipment and Operation. Refer to paragraph 1.6 and table 2-1 for equipment characteristics and operation of each type of battery facility. In addition, the manufacturers manuals should be consulted before start of installation for more detailed and specific information.

3.3.2 Installation Steps. The batteries and rectifier-chargers should be installed and tested in the following sequential steps to assure compliance with the installation drawings. Changes to the sequence of installation procedures may be made in consideration of available manpower, material, equipment, and facilities.

a. Before proceeding with the unpacking and installation of the lead/calcium-acid cells, review the safety precautions listed in paragraph 3.2.3.

b. Inventory material and equipment and inspect for damage. Check the plastic cell cases, internal lead plates, and bridges of the battery cells for breaks and cracks. Report all damage promptly. Do not remove the seal from the vent caps at this time.

c. Turn on the battery room exhaust fan. Leave the fan on and the door open for the duration of the battery room installation portion of this project.

d. Lay out the battery room floor and establish reference working lines. The battery rack location is shown in the EIP for the particular project.

e. Assemble the battery rack in the battery room in accordance with the manufacturer's drawings and instructions. Anchor the rack to the floor as shown in the EIP.

f. Install ceiling- and wall-mounted cable ducts as shown in the EIP.

g. Review the installation and operation instructions furnished with the batteries.

h. Study the battery layout to determine the location of positive and negative terminals of the battery. Measure and mark the center of each rack stringer length. Starting with the lower step of each rack, center the middle cell on this mark and place the remaining cells with 1/2-inch spacing between adjacent cells. The positive (+) terminal of each cell adjoins the negative (-) terminal of the next cell. Adjacent cells should not touch nor come in contact with the metal rack supports. Do not remove the grease applied at the factory from the cell post surfaces. Recoat any conducting surfaces that may have been exposed during handling with NO-OX-ID grease.

i. Gently clean the contact surfaces only at the lead-plated intercell connectors, terminal plates, and cable lugs, using a brass suede brush or #00 grade sandpaper. (Do not use coarse abrasives, as lead plating may be removed, exposing copper.) As contact surfaces are cleaned, apply a thin coating of NO-OX-ID grease to these surfaces only. Starting at the center of the cell row, install connectors per wiring diagram and cell arrangement. As intercell connectors are installed, adjust them to a level position and finger-tighten hardware. After all connectors are in place, tighten terminal hardware to 100 inch-pounds. Following the torquing of the hardware, apply a thin coating of NO-OX-ID grease to bolts, washers, and nuts, using a small, stiff brush. Complete connecting of cells by installing intertier cable connectors. (Do not connect battery to rectifiers at this time.) Recheck to be certain that the cells are connected positive (+) to negative (-) throughout each of the strings.

j. Using rubber gloves, a rubber apron, and goggles, check the specific gravity of the electrolyte with a hydrometer. If the reading is higher than 1.205, the electrolyte should be

diluted to 1.205 for filling the cells. Prepare sufficient electrolyte to fill a cell prior to removing the vent caps. Use only distilled water for mixing electrolyte. See paragraph 7.6.1 for instructions on reading specific gravity. The battery electrolyte (acid) should have a specific gravity of 1.205 for initial filling of cells. If 1.400 or 1.835 acid has been furnished with the project BOM, dilute the acid in accordance with table 3-1. (When fully charged, the specific gravity should rise to 1.210 or 1.215 depending on the battery manufacturer's recommendation. Adjust to the correct value if required.)

k. Remove each vent cap and thoroughly remove all the tape or other material used to seal the vent cap hole. Fill the cells with the previously prepared electrolyte to the middle of the high/low electrolyte level marks on the plastic jars. Allow the cells to stand for 1 to 2 hours after filling, then adjust the electrolyte, if necessary, to the proper height midway between the high and low marker lines on each cell.

l. Lay out the dc equipment room floor and establish reference working lines. The location of the dc power racks will be shown on the EIP drawing.

m. Install the components in the racks as shown in the SEIP or EIP drawings.

n. Install the ac power and ground runs as shown on the SEIP or EIP drawing.

o. Install battery cables up to the battery terminals, but do not connect to battery or charger buses at this time.

p. Install the other dc power, ground reference, and alarm cables as shown on the SEIP drawing.

q. After the tests in table 7-4 have been passed, connect the battery to the rectifier-chargers and power board as shown on the SEIP drawing.

r. After the completed battery facility has passed all tests, insert the individual load fuses and transfer the facility to the O&M agency.

Table 3-1. Sulphuric Battery Acid Mixing Chart
for Mixing by Volume

Using 1.400 acid*	Specific gravity desired at 77° F	Using 1.835 acid
Parts water required to one part acid		Parts water required to one part acid
.905	1.225	3.80
.96	1.220	3.91
1.00	1.215	4.03
1.05	1.210	4.15
1.11*	1.205	4.26
1.16	1.200	4.43
1.22	1.195	4.59
1.27	1.190	4.73

*Typical

NOTES:

1. Use only distilled water.
2. Since addition of concentrated sulphuric acid to water generates heat, the electrolyte must be prepared in advance to allow time for cooling. The electrolyte temperature should not be more than 90° when poured into the cells.

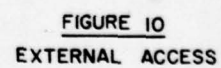
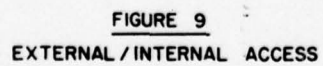
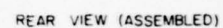
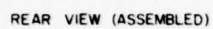
CAUTION: Always pour acid into water--**NEVER** water into acid. Pour acid slowly, since fast pouring will generate enough heat to induce violent boiling. Wear rubber gloves, rubber apron, and goggles while preparing electrolyte and filling cells.

SECTION 4. ENGINEERING INSTALLATION DRAWINGS

4.1 GENERAL. This section contains the engineering installation drawings necessary for the installation of the four types of 48-V dc battery power facilities with load capacities from 50 to 400 amperes. The SEIP drawings should be modified and supplemented to fit a particular site by the responsible engineering agency in accordance with CCCR 34-2. The following drawings are included as part of this SEIP:

STD-MS-0017, SH 7 of 8	Typical Equipment Rack Assembly Details (Convenience Outlet)
STD-MS-0018	48-V Dc, 50-A Basic Battery Facility
STD-MS-0019	48-V Dc, 100-A CEMF Cell Battery Facility
STD-MS-0020	48-V Dc, 200-A CEMF Cell Battery Facility
STD-MS-0021	48-V Dc, 400-A End Cell Battery Facility
STD-MS-0025	U.S., Central American, European, Japanese, and South China Sea Seismic Zone Maps

4.2 MODIFICATION OF INSTALLATION DRAWINGS. The engineering drawings may be modified during and after the installation of a project to reflect changes. Drawing changes will be marked with colored pencils as follows: red for additions, blue for engineering notes, and yellow for deletions. Copies of modified drawings should be retained at each site and should also be forwarded to the responsible area office of the C-E engineers for corrective action.



3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

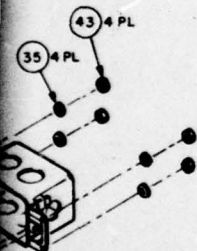
701. CONVENIENCE OUTLET ASSEMBLIES ARE SELECTED AS REQUIRED. THE DUAL ACCESS (EXTERNAL/INTERNAL) UNIT IS USED IN RACKS WHICH CONTAIN A BLOWER ASSEMBLY (BOM 1). OTHER RACKS WHICH REQUIRE A CONVENIENCE OUTLET SHALL USE THE EXTERNAL ACCESS UNIT.
702. THE CONVENIENCE OUTLET SHALL BE CONNECTED TO NON-CRITICAL POWER SOURCE.

D

C

B

A



DESIGN NO	STD-MS-0017	SIZE/TYPE NO	D	DRAWING NO	
DRAWN BY	G. VERDI	SCALE	NONE	PLotted IN	7 OF 8
APPROVED	<i>[Signature]</i>				

3

2

1

ITEM	SML	DESCRIPTION	NSN	UI	QTY
185	218258	BUS BAR, LORAIN 3425-194	NSNR	EA	
184	06906W	WIRE, ELEC, TW, STR, 4 AWG, BLK, INS, 600V	6145-00-939-4948	FT	
183	11674C	WIRE, ELEC, TW, STR, 4 AWG, WHT, INS, 600V	6145-00-949-5200	FT	
182	03570N	WIRE, SINGLE COND, 8 AWG BLK, SOL, INS, 600V	6145-00-470-8255	FT	
181	06535A	WIRE, SINGLE COND, 8 AWG WHT, SOL, INS, 600V	6145-00-479-0042	FT	
180	03538G	WIRE, SINGLE COND, 10 AWG BLK, SOL, INS, 600V	6145-00-990-2999	FT	
179	03507W	WIRE, SINGLE COND, 10 AWG WHT, SOL, INS, 600V	6145-00-990-3000	FT	
178	03509A	WIRE, 14 AWG, WHT, SOL, 600V, INS	6145-00-050-7407	FT	
177	03540K	WIRE, 14 AWG, BLK, SOL, 600V, INS	6145-00-050-7405	FT	
176	11672A	WIRE, ELEC, TW, 18 AWG RED, SOL, INS, 600V	6145-00-089-6811	FT	
175	23193Y	WIRE, ELEC, TW, 18 AWG BLK, STR, INS	6145-00-524-9130	FT	

LIST OF MATERIALS

174	09217J	WIRE, ELEC, TW, 18 AWG WHT, STR, INS	6145-00-681-8374	FT	
173	16954C	WIRE, ELEC, TW, 20 AWG BLU STR, BELDEN 8919-13	NSNR	FT	
172	00596C	WASHER, LOCK, SPLIT, STEEL, 3/8"	5310-00-637-9541	EA	
171	10231A	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, 1/4"	5310-00-808-5381	EA	
170	09019J	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, #8	5310-00-045-3299	EA	
169	08658A	WASHER, FLAT, STEEL, 3/8"	5310-00-087-7493	EA	
168	14518W	WASHER, FLAT, STEEL, CAD PLTD, 1/4"	5310-00-141-1795	EA	
167	00487C	WASHER, FLAT, STEEL, CAD PLTD, #8	5310-00-167-0833	EA	
166	24830C	TRANSIENT PEAK LIMITER, 23" X 7", 1AM DMG STD-MS-0023	NSNR	EA	
165	23199Z	TERMINAL STRIP, 22 POSITIONS, CURTIS 1522 ST	NSNR	EA	
164	21956A	TERMINAL BLOCK, SQUARE D, TYPE 9080-CA-10	5820-00-101-3310	EA	
163	13561K	TAPE, INSULATING, ELEC, BLACK 3/4" X 108"	5970-00-816-6056	RL	
162	23204E	TAPE, INS, ELEC, WHITE, 3/4" X 216", 1500 V	5970-00-295-8161	RL	
161	00230J	SCREW, CAP 3/8-16 X 1-1/2", HEX HD STEEL	5305-00-022-7798	EA	
160	10130J	SCREW, MACH, STEEL, CAD PLTD, 1/4-20 X 1"	5305-00-988-1727	EA	
159	13953E	SCREW, MACH, 12-24 X 3/4", PAN HEAD	5305-00-639-7970	EA	
158	09098K	SCREW, MACH PAN HD STEEL CAD PLTD, 8-32 X 1"	5305-00-206-3713	EA	
157	21841F	RACK ADAPTER, 19" TO 23", LORAIN 3571-311	NSNR	EA	
156	21846A	PROTECTIVE SCREEN 23" X 36", LORAIN 4141-406	NSNR	EA	
155	24828B	PANEL, TERM, 23" X 3-1/2", LORAIN 4341-036	NSNR	EA	
154	24829C	PANEL, LO-VOLT DISCONNECT, 100A, LORAIN 4863-718	6130-00-177-3097	EA	
153	20960E	PANEL, BLANK, 23" X 7", LORAIN 3534-103	5975-00-101-3513	EA	
152	20979C	PANEL, BLANK, 23" X 5-1/4", LORAIN 3533-106	5975-00-101-3512	EA	
151	20961F	PANEL, BLANK, 23" X 3-1/2", LORAIN 3532-112	NSNR	EA	
150	20942W	PANEL, BLANK, 23" X 1-3/4", LORAIN 3531-106	NSNR	EA	
149	00558H	NUT, PLAIN, HEX, STEEL, CAD PLTD, 1/4-20	5310-00-285-1650	EA	
148	07675L	NUT, PLAIN, HEX, STEEL, CAD PLTD, #8-32	5310-00-550-2490	EA	
147	23942F	MOUNTING CHANNEL, SQUARE D, TYPE 1828-C22X38	NSNR	EA	
146	21955Z	LUG, TERMINAL, #10 AWG, T&B RC 10-14	5940-00-866-2586	EA	
145	21720F	LUG, TERMINAL, #22 AWG, T&B STAKON, RA-1123	5940-00-848-8847	EA	
144	21824A	LUG KIT, #4-3/0 AWG, LORAIN 4835-526	5180-00-101-3523	EA	
143	21708F	LUG KIT, #14-4 AWG, LORAIN 4835-523	5180-00-101-3522	EA	
142	21710G	LUG ADAPTER, ANGLE, LORAIN 3627-531	5940-00-101-3498	EA	
141	02622D	LOCKNUT, CONDUIT, 2", T&B #146	5975-00-642-7263	EA	
140	21726B	JUMPER, SQUARE D, TYPE 9080-JCA-6	NSNR	EA	
139	23113D	INSULATING MOUNTING ASSEMBLY 23" X 4", LORAIN 4133-036	NSNR	EA	
138	21695C	HEAT BAFFLE, 23" X 3-1/2", LORAIN 4133-024	NSNR	EA	
137	21712W	GROUND TERMINAL STRIP, LORAIN 4835-530	5940-00-101-3520	EA	
136	21836B	GROUND BAR, COPPER, 400A, 23" MTG, LORAIN 4361-040	NSNR	EA	
135	21729E	FUSE BLOCK, 10 POLES, LITTLEFUSE 556010	NSNR	EA	
134	24827A	FUSE ALARM ASSEMBLY, LORAIN 4265-019	NSNR	EA	
133	22172M	FUSE LINK, 100A, 250V, LORAIN 2484-631	NSNR	EA	
132	24826Z	FUSE LINK, 70A, 250V, LORAIN 2484-625	5920-00-067-6283	EA	
131	180430	FUSE, TYPE 70 (INDICATING ALARM) 1-1/3A, LORAIN 2486-208	5920-00-904-2671	EA	
130	21698F	FUSE, NON-TYPE, 30A, LORAIN 2483-515	NSNR	EA	
129	24048B	FUSE, NON-TYPE, 25A, LORAIN 2483-513	NSNR	EA	
128	21837C	FUSE, NON-TYPE, 20A, LORAIN 2483-511	NSNR	EA	
127	18041X	FUSE, NON-TYPE, 15A, LORAIN 2483-509	NSNR	EA	
126	18042R	FUSE, NON-TYPE, 10A, LORAIN 2483-507	NSNR	EA	
125	24047A	FUSE, 6A, 250V, LORAIN 2483-505	NSNR	EA	
124	24825W	FUSE, 3A, 250V, LORAIN 2483-503	NSNR	EA	
123	24440K	FUSE, SAB, SLO-BLO, 15A, LITTLEFUSE 523015	NSNR	EA	
122	21723W	FUSE, SAB, SLO-BLO, 10A, LITTLEFUSE 523010	NSNR	EA	
121	24439H	FUSE, SAB, SLO-BLO, 5A, LITTLEFUSE 523005	NSNR	EA	
120	24438G	FUSE, SAB, NORMAL, 15A, LITTLEFUSE 514015	NSNR	EA	
119	24437F	FUSE, SAB, NORMAL, 10A, LITTLEFUSE 514010	NSNR	EA	
118	24436E	FUSE, SAB, NORMAL, 8A, LITTLEFUSE 512008	NSNR	EA	
117	21724Z	FUSE, SAB, NORMAL, 5A, LITTLEFUSE 512005	5920-00-280-3469	EA	
116	24435D	FUSE, SAB, NORMAL, 3A, LITTLEFUSE 512003	NSNR	EA	
115	24434C	FUSE, SAB, NORMAL, 2A, LITTLEFUSE 512002	NSNR	EA	
114	24433B	FUSE, SAB, NORMAL, 1A, LITTLEFUSE 512001	NSNR	EA	
113	24449G	FUSE, SAB, 15A, 250 V, LITTLEFUSE 314015	NSNR	EA	
112	24448F	FUSE, SAB, ALARM, 5A, LITTLEFUSE	5920-01-007-5677	EA	
111	24447E	FUSE, SAB, ALARM, 4A, BUSS	5920-00-806-3152	EA	
110	24446D	FUSE, SAB, ALARM, 3A, LITTLEFUSE	5920-00-133-4898	EA	
109	24445C	FUSE, SAB, ALARM, 3A, BUSS	5920-00-503-4843	EA	
108	24444B	FUSE, SAB, ALARM, 2A, LITTLEFUSE	5920-01-007-5676	EA	
107	24443A	FUSE, SAB, ALARM, 2A, BUSS	5920-00-295-7013	EA	
106	24442Z	FUSE, SAB, ALARM, 1A LITTLEFUSE	5920-00-195-2330	EA	
105	24441J	FUSE, SAB, ALARM, 1A, BUSS	5920-00-665-0615	EA	
104	24429W	FUSE, 1/4A WITH 10 OHM RESISTOR, LORAIN 2486-203	NSNR	EA	
103	23950H	FUSE, INDICATING, TYPE 70, 5A	5920-00-538-6205	EA	
102	24428H	FUSE, INDICATING, TYPE 70, 3A	5920-00-284-9218	EA	
101	24427G	FUSE, INDICATING, TYPE 70, 2A	5920-00-284-9217	EA	

LIST OF MATERIALS

100	24426F	FUSE, IND			
99	24432A	FUSE, GRA			
98	24431Z	FUSE, GRA			
97	12237Z	FUSE, GRA			
96	16432K	FUSE, GRA			
95	24430J	FUSE, GRA			
94	14624E	FUSE, GRA			
93	24831D	FUSE, GNT			
92	17144H	FUSE, GNT			
91	24425E	FUSE, GNT			
90	16582Y	FUSE, GNT			
89	24424D	FUSE, GNT			
88	10313D	FUSE, GNT			
87	00740C	EXPANSON			
86	21725A	COPPER ST			
85	21019G	COMPOUND			
84	24404F	CAPACITOR			
83	03524D	CABLE, SI			
82	24824H	CABLE, SI			
81	03499A	CABLE, SI			
80	03516G	CABLE, SI			
79	23985E	CABLE, SI			
78	20993E	CABLE, 11			
77	21717D	CABLE, 3-			
76	15104A	CABLE, 1-			
75	21705C	BUSHING,			
74	24823G	SWITCH, 5			
73	24822F	RECTIFIER			
72	22202D	RACK, 23"			
71	24819D	METER PAN			
70	24820D	LORAIN 41			
69	24821E	AMMETER,			
68	24822F	AMMETER,			
67	24823G	KIT, EME			
66	24824H	INVERTER,			
65	24825E	60 HZ, LE			
64	24826F	INVERTER,			
63	24827G	60 HZ, LE			
62	24828H	FUSE PAN			
61	24829I	LORAIN 41			
60	24830J	FUSE PAN			
59	24831K	POSITIONS			
58	24832L	FUSE PAN			
57	24833M	LORAIN 41			
56	24834N	FUSE PAN			
55	24835O	RESTRAIN			
54	24836P	BATTERY			
53	24837Q	AND 4 RE			
52	24838R	BATTERY			
51	24839S	RESTRAIN			
50	24840T	BATTERY			
49	24841U	AND 4 RE			
48	24842V	BATTERY			
47	24843W	RESTRAIN			
46	24844X	BATTERY			
45	24845Y	AND 4 RE			
44	24846Z	BATTERY			
43	24847A	RESTRAIN			
42	24848B	BATTERY			
41	24849C	AND 4 RE			
40	24850D	BATTERY			
39	24851E	RESTRAIN			
38	24852F	BATTERY			
37	24853G	AND 4 RE			
36	24854H	BATTERY			
35	24855I	RESTRAIN			
34	24856J	BATTERY			
33	24857K	AND 4 RE			
32	24858L	BATTERY			
31	24859M	RESTRAIN			
30	24860N	BATTERY			
29	24861O	AND 4 RE			
28	24862P	BATTERY			
27	24863Q	RESTRAIN			
26	24864R	BATTERY			
25	24865S	AND 4 RE			
24	24866T	BATTERY			
23	24867U	RESTRAIN			
22	24868V	BATTERY			
21	24869W	AND 4 RE			
20	24870X	BATTERY			
19	24871Y	RESTRAIN			
18	24872Z	BATTERY			
17	24873A	AND 4 RE			
16	24874B	BATTERY			
15	24875C	RESTRAIN			
14	24876D	BATTERY			
13	24877E	AND 4 RE			
12	24878F	BATTERY			
11	24879G	RESTRAIN			
10	24880H	BATTERY			
9	24881I	AND 4 RE			
8	24882J	BATTERY			
7	24883K	RESTRAIN			
6	24884L	BATTERY			
5	24885M	AND 4 RE			
4	24886N	BATTERY			
3	24887O	RESTRAIN			
2	24888P	BATTERY			
1	24889Q	AND 4 RE			

LIST OF MATERIALS

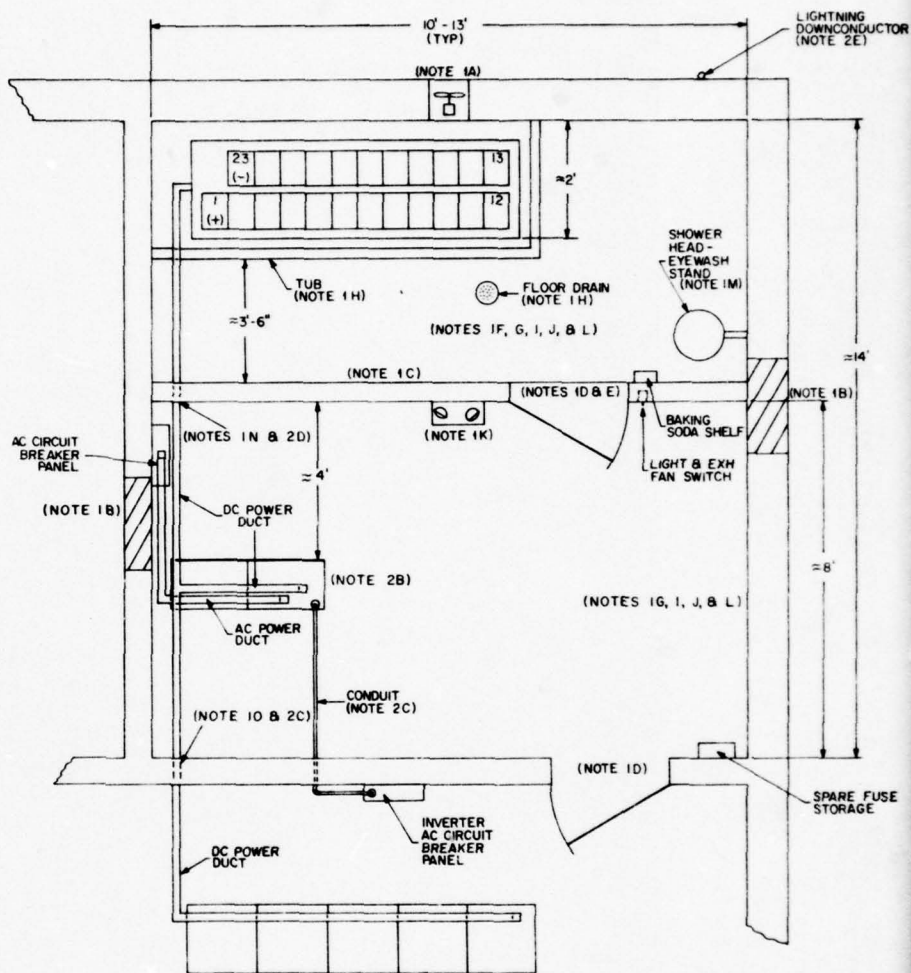


FIGURE 1

**TYPICAL 48 V DC BATTERY
FACILITY LAYOUT
(NOTE 2A)**

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

1. FACILITY ENGINEER NOTES:

- A. PROVIDE AND INSTALL A 400- TO 800-CFM, ELECTRIC, SPARK-PROOF EXHAUST FAN IN THE BATTERY ROOM WITH ON/OFF SWITCH LOCATED OUTSIDE NEAR THE BATTERY ROOM ENTRANCE DOOR.
- B. WALL IN UNNECESSARY DOOR, WINDOW, OR OTHER OPENINGS WITH MASONRY.
- C. ERECT A PERMANENT PARTITION OR WALL FROM FLOOR TO CEILING.
- D. PROVIDE AND INSTALL AN ENTRANCE DOOR = 3'-3" WIDE AND 6'-3" HIGH WITH LOCKING DEVICE ON THE DC EQUIPMENT ROOM DOOR.
- E. PROVIDE A 1" OR HIGHER DOOR SILL TO CONTAIN LIQUIDS WITHIN THE BATTERY ROOM.
- F. REMOVE ANY EXISTING NORMAL LIGHTING FIXTURES, SWITCHES, ELECTRICAL OUTLETS, AND UNUSED ELECTRICAL WIRING IN THE PROPOSED BATTERY ROOM.
- G. REMOVE ANY UNNECESSARY HEATERS AND PLUMBING.
- H. IF A FLOOR DRAIN IS USED IN THE BATTERY ROOM, PROVIDE A LEVEL AREA (±1/8") FOR THE BATTERY BANK. SLOPE THE REMAINING FLOOR AREA TO THE DRAIN. THE DRAIN SHOULD BE ROUTED TO AN ACID CATCH BASIN WHERE ACID CAN BE NEUTRALIZED AND DRAINED OR PUMPED INTO THE SEWER NETWORK IN CASE OF LARGE SPILLS. IF A DRAIN CANNOT BE USED, AN ACID-PROOF TUB (CONCRETE OR OTHER) MUST BE PROVIDED UNDER THE BATTERY RACK TO CONTAIN POTENTIAL SPILLS. (SEE SHEET 4, TABLE 3, FOR BATTERY RACK DIMENSIONS.)
- I. PATCH ANY HOLES AND PAINT THE TUB, WALLS (TO A HEIGHT OF 5'), AND FLOOR WITH AN ACID-RESISTANT COATING. PAINT THE REMAINING WALL AND CEILING TO MATCH THE OTHER AREAS. PATCH AND PAINT THE DC EQUIPMENT ROOM TO MATCH.
- J. PROVIDE AND INSTALL SPARK-PROOF LIGHTING FIXTURES IN THE BATTERY ROOM WITH THE ON/OFF SWITCH LOCATED OUTSIDE THE BATTERY ROOM DOOR. MINIMUM ILLUMINATION SHOULD BE 30 FOOT-CANDLES 3 FEET ABOVE THE FLOOR. PROVIDE AND INSTALL FLUORESCENT LIGHT FIXTURES IN THE DC EQUIPMENT ROOM. REQUIRED ILLUMINATION IS 50 FOOT-CANDLES 3 FEET ABOVE THE FLOOR.
- K. PROVIDE AND INSTALL AUTOMATIC EMERGENCY LIGHTING TO ILLUMINATE THE DC EQUIPMENT RACK FRONTS AND DOOR DURING AC POWER FAILURES.
- L. PROVIDE LONG-TERM ENVIRONMENTAL CONTROL TO KEEP THE BATTERY AND DC EQUIPMENT ROOMS BETWEEN 60°F (15.6°C) AND 85°F (29.4°C) AND A RELATIVE HUMIDITY RANGE OF 20 TO 60 PERCENT. OCCASIONAL TEMPERATURE AND HUMIDITY VARIATIONS ABOVE AND BELOW THE ABOVE LIMITS ARE PERMISSIBLE.
- M. PROVIDE AND INSTALL A COLD WATER DELUGE SHOWER HEAD AND EYEWASH STAND.
- N. PROVIDE AN OPENING FOR THE DC POWER DUCT BETWEEN THE DC EQUIPMENT AND BATTERY ROOMS.
- O. PROVIDE OPENINGS IN THE CEILING/WALL FOR THE AC AND DC POWER DUCTS BETWEEN THE DC POWER AND COMMUNICATIONS EQUIPMENT.

2. COMMUNICATIONS ENGINEER NOTES:

- A. THIS LAYOUT IS TYPICAL FOR A BATTERY FACILITY LOCATION ON THE SAME FLOOR WITH THE COMMUNICATIONS EQUIPMENT.
- B. AN INVERTER FROM 0.5 TO 1 KVA CAN BE INSTALLED TO PROVIDE 120-V AC, 1ϕ, 50/60 HZ POWER FOR CRITICAL AC-POWERED EQUIPMENT.
- C. THE DUCTS BETWEEN THE BATTERY FACILITY AND COMMUNICATIONS EQUIPMENT SHOULD CONTAIN AN INSULATING COUPLING NEAR THE PENETRATIONS IN THE DC EQUIPMENT ROOM TO PREVENT ELECTRICAL NOISE FROM THE DC POWER RACKS FROM BEING CONDUCTED TO THE COMMUNICATIONS EQUIPMENT ALONG THE METAL DUCTS.
- D. AFTER ALL CABLES ARE INSTALLED, SEAL THE INSIDE OF THE DC DUCT AT THE PENETRATION BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS WITH NONHARDENING SEALER TO PREVENT CONDUCTION OF GASES TO THE DC EQUIPMENT RACKS.
- E. GROUND THE BATTERY RACK ONLY IF LOCATED WITHIN 6 FEET OF A LIGHTNING DOWN-CONDUCTOR.

DESIGN NO. STD-MS-0018	SIZE D	FIGURE NO. 50470	DRAWING NO.
SHEET 2 OF 14	SCALE NONE		SHEET OF
DRAWN BY L. H. LEE			
APPROVED <i>H. M. Sola</i>			

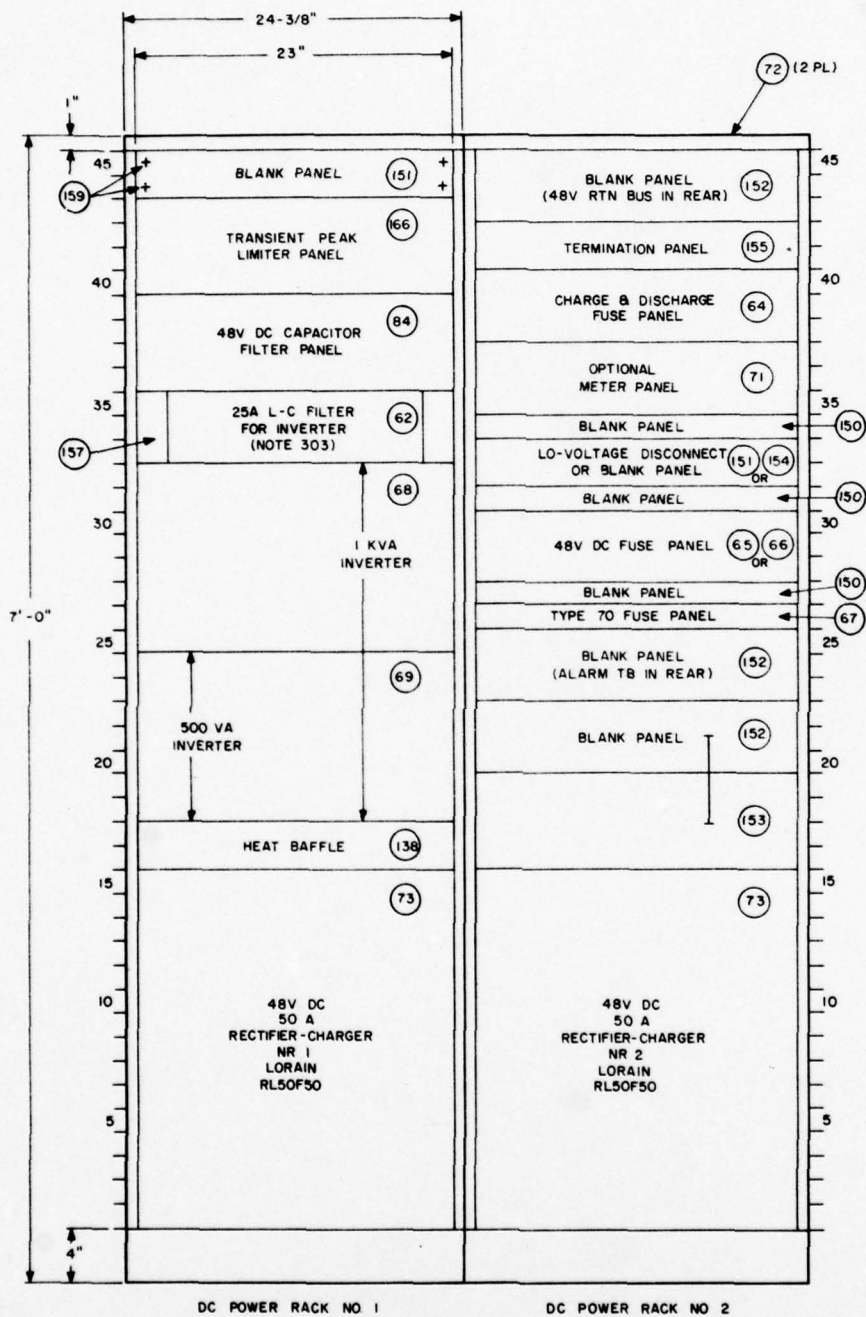


FIGURE 2
DC POWER EQUIPMENT RACK FACE LAYOUT

TABLE 1

LORAIN INVERTER CHARACTERISTICS (NOT)	
	500 VA
LORAIN MODEL NUMBER	WAAS01B
INPUT VOLTAGE, VOLTS DC	42-56
NO LOAD CURRENT, AMPS DC	3.1
FULL LOAD CURRENT, AMPS DC	13.6
OUTPUT VOLTAGE, VOLTS AC	120
FREQUENCY, Hz	60
EFFICIENCY, PERCENT	70
HEIGHT, IN	12-7/32
WIDTH, IN	19
DEPTH, IN	13
WEIGHT, LB	115
MOUNTING	RACK

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

D

1. GENERAL ENGINEER NOTES:

- A. THE RACK LINEUP SHOULD BE OPTIMIZED FOR THE PARTICULAR APPLICATION. RACKS SHOULD BE EASILY ACCESSIBLE FOR MAINTENANCE. RACKS SHOULD ALSO BE PLACED FOR MINIMUM AVERAGE CABLE LENGTHS TO ALL CONNECTED EQUIPMENT.
- B. SPACE IS REQUIRED IN BACK OF ALL EQUIPMENT RACKS. MINIMUM CLEARANCE IS 24 INCHES. DESIRABLE DISTANCE IS 36 INCHES OR GREATER.
- C. ONE SIDE OF THE EQUIPMENT LINEUP CAN BE PLACED AGAINST A WALL OR OTHER EQUIPMENT. IF PLACED AGAINST A WALL, ALLOW A MINIMUM OF 4 INCHES OF CLEARANCE.

2. GENERAL INSTALLER NOTES:

A. RECTIFIER-CHARGER AND CONTROL RACK INSTALLATION STEPS.

- (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
- (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
- (3) DETERMINE FLOOR POSITION AND BOLT THE RECTIFIER-CHARGER AND CONTROL RACKS TO THE FLOOR.
- (4) BOLT THE RACKS TOGETHER NEAR THE TOP.
- (5) INSTALL THE RECTIFIER-CHARGERS IN RACKS 1 AND 2.
- (6) ASSEMBLE THE DISTRIBUTION RACK.
- (7) INSTALL THE AC AND DC POWER DUCTS OVER THE RACKS AND INTO THE BATTERY ROOM.
- (8) INSTALL DC POWER CABLES UP TO THE BATTERY TERMINALS, BUT DO NOT CONNECT TO THE BATTERY AT THIS TIME. (TAPE THE ENDS OF THE CABLES TO PREVENT ACCIDENTAL CONTACT.)
- (9) INSTALL AC AND REMAINING DC POWER CABLES.
- (10) COMPLETE WIRING OF THE RECTIFIER-CHARGER AND CONTROL RACKS.
- (11) AFTER ALL CABLES ARE INSTALLED, PROVIDE A BARRIER INSIDE THE DUCT WHERE IT CROSSES BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS.

B. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH SECTION 7 OF THIS SEIP.

NOTE:

301. SELECT THE APPROPRIATE FUSE PANELS FOR LOCAL DISTRIBUTION. SEE SHEET 11. COVER UNUSED RACK SPACE WITH BLANK PANELS.
302. SUITABLE ALTERNATE INVERTERS ARE LAMARCHE AS1-500-48V (500 VA) AND AS1-1K-48V (1 KVA).
303. IF A 1-KVA INVERTER IS TO BE INSTALLED AND OPERATED AT FULL LOAD (26.2 A DC), A 50A DECENTRALIZING FILTER MAY BE INSTALLED. THE RACK ADAPTER KIT IS NOT REQUIRED FOR THE 50A FILTER.

C

B

A

302)
1 KVA
MAA102B
42-56
6.1
26.2
120
60
70
26-1/4
23
15
220
RACK

REVISED STD-MS-0018		SIZE	PSCH NO	WORKING NO
SHEET 3 OF 4		D	50470	
DRAWN BY G VERDI		SCALE	NONE	SHEET OF
APPROVED <i>H.M. Sola</i>				

2

3

2

1

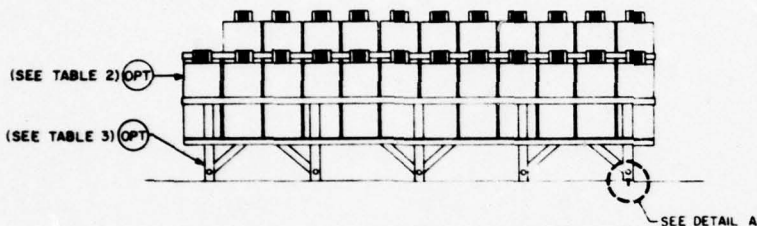


FIGURE 3
TYPICAL BATTERY & RACK INSTALLATION

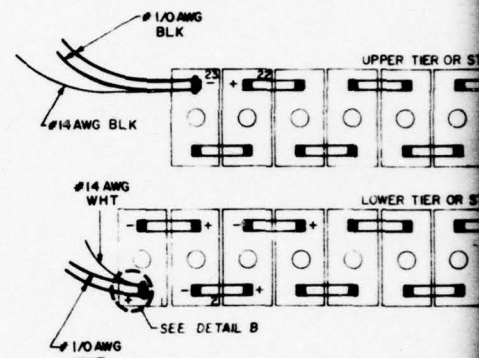


FIGURE 4
TYPICAL BATTERY INTERCONNECT

TABLE 2
BATTERY CAPACITY AND CELL TYPE

REQUIRED FULL LOAD BATTERY POWER, HOURS	CELL TYPE (NOTE 1D)		
	CAD	GOULD	EXIDE
1	KC-9	NCX-300	EC-9
4	KC-17	NCX-600	EC-15
8	LCT-1000	NCX-1000	2BC-11

TABLE 3
BATTERY BANK DATA

NAME	BATTERY CELL	TWO-STEP RACK									TWO-TIER RACK									CONTAINERS OF ELECTROLYTE		DIFFUSER VENT NO.
		BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS			BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS			15 GAL	5 GAL					
			1	2	304	L	W	H		1	2	304	L	W	H							
CAD	KC-9	RD-803-6	-EP1	-EP1	-EP11	6'	24"	25.75"	RD-801-6	-EP1	-EP1	-EP11	6'	16"	35.75"	3	1	PV-225				
	KC-17	RD-803-9	-EP1	-EP1	-EP11	9'	24"	25.75"	RD-801-9	-EP1	-EP1	-EP11	9'	16"	36.75"	6	1	PV-225				
	LCT-1000	RD-903-9	-EP1	-EP1	-EP11	9'	30"	29.69"	RD-901-9	-EP1	-EP1	-EP11	9'	20.81"	48.69"	10	-	PV-223				
GOULD	NCX-300	S07-078188	-333	-666	-666	5'	24.75"	21.75"	S07-078148	-333	-666	-666	5'	15.75"	35.25"	2	2	HD3-100001				
	NCX-600	S07-074516	-333	-666	-666	8'	30.75"	23.75"	S07-074478	-333	-666	-666	8'	19.75"	41.25"	9	1	HD3-100001				
	NCX-1000	S07-074516	-333	-666	-666	8'	30.75"	23.75"	S07-074478	-333	-666	-666	8'	19.75"	41.25"	8	-	HD3-100001				
EXIDE			1	283	4					1	283	4										
	EC-9	00950-72	00950-72	01727-72	01727-72	6'	23.75"	14"	00437-72	00950-72	00950-72	00950-72	6'	17"	33"	2	2	00206				
	EC-15	00953-100	00953-100	01730-100	01730-100	9'	23.75"	14"	00940-100	00953-100	00953-100	00953-100	9'	17"	33"	4	2	00206				
	2BC-11	00596-04	00596-04	00670-04	03987-04	7'	42"	22.01"	00630-04	00630-04	00705-04	00705-04	7'	32"	00.00"	10	1	00000				

REVISION			
ZONE	REV	DESCRIPTION	DATE

1. GENERAL ENGINEER NOTES:

- TWO-STEP BATTERY RACK PERMITS EASIER MAINTENANCE BUT REQUIRES GREATER DEPTH. WHERE THE BATTERY ROOM IS SHALLOW, A TWO-TIER RACK MAY BE PREPARED. SEE TABLE 2 FOR BATTERY RACK DIMENSIONS. REFER TO DRAWING STD-MS-0018 TO DETERMINE SHOCK PROTECTION REQUIREMENTS FOR BATTERY RACKS. ADD SUFFICES SHOWN IN THE SEISMIC ZONE COLUMNS TO THE BASIC RACK NUMBER FOR C & D AND GROUND RACKS. ORDER RACK NUMBERS SHOWN IN SEISMIC ZONE COLUMN FOR EXLITE RACKS. (NOTE THAT EXLITE BATTERY RACKS FOR ZONES 2 & 3 ARE IN COLUMN 2. ZONE 4 RACKS ARE IN COLUMN 3.)
- FOR CORRUSION INSTALLATION, CELLS SHOULD BE SHIPPED MET, FILLED WITH THE PROPER ELECTROLYTE FROM THE MANUFACTURER'S PLANT. FOR OVERSEAS SHIPMENT, CELLS SHOULD BE SHIPPED DRY-CHARGED, TO BE FILLED WITH ELECTROLYTE AFTER INSTALLATION.
- ALL CELLS SHOULD BE EQUIPPED WITH DIFFUSER VENTS. ORDER THEM SEPARATELY IF NOT FURNISHED AS PART OF EACH CELL. SEE TABLE 3.
- BASED ON A MINIMUM BATTERY TERMINAL VOLTAGE OF 45.5 V (44.0 MIN FOR EQUIP AND 1.5 VOLT LINE DROP).
- ORDER THE FOUR LEAD-PLATED COPPER TERMINAL LUGS AS PART OF THE BATTERY PACKAGE.
- BATTERY RACK DIMENSIONS ARE WITHOUT SEISMIC BRACING. ALLOW APPROXIMATELY 2" ADDITIONAL WIDTH FOR TWO-TIER AND 10" ADDITIONAL WIDTH FOR TWO-STEP RACKS WITH SEISMIC BRACING. (NOTE THAT THE LENGTH OF SOME EXLITE RACKS IS INCREASED FOR SEISMIC ZONES 2, 3, AND 4. THE RACK LENGTH IS PROVIDED IN INCHES FOLLOWING THE PART NUMBER AND DASH.)

2. GENERAL INSTALLER NOTES:

A. BATTERY BANK INSTALLATION STEPS:

- INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
- LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
- ASSEMBLE THE BATTERY BANK AND ANCHOR TO THE FLOOR. THE FLOOR SPACE FOR THE BATTERY BANK SHOULD BE LEVEL. IF THIS IS NOT THE CASE, USE STEEL PLAT WASHERS UNDER THE BATTERY RACK LEGS TO LEVEL THE BATTERY RACK PRIOR TO INSTALLING THE CELLS.
- BEFORE PROCEEDING WITH THE UNPACKING, HANDLING, INSTALLATION, AND OPERATION OF THE LEAD-ACID CELLS, REVIEW THE SAFETY PRECAUTIONS LISTED IN THE MANUFACTURER'S MANUAL.
- EXAMINE ALL CELLS FOR CONCEALED DAMAGE.
- PLACE CELLS ON BATTERY RACK AND INSTALL CELL TERMINAL HARDWARE.
- ELECTROLYTE IS SHIPPED IN CONCENTRATED FORM AND MUST BE DILUTED WITH DISTILLED WATER PRIOR TO USE IN THE CELLS. USE OF CONCENTRATED (HIGH SPECIFIC GRAVITY) ACID WILL DAMAGE THE CELL. INITIAL FILLING OF CELLS SHALL BE DONE WITH ELECTROLYTE HAVING A SPECIFIC GRAVITY BETWEEN 1.200 AND 1.206.
- PRIOR TO REMOVING BATTERY CAPS, PREPARE SUFFICIENT ELECTROLYTE TO FILL SEVERAL CELLS. SINCE ADDITION OF CONCENTRATED SULFURIC ACID TO WATER GENERATES HEAT, THE ELECTROLYTE MUST BE PREPARED IN ADVANCE TO ALLOW TIME FOR COOLING. THE ELECTROLYTE SHOULD NOT BE ANYWATER THAN 90°F WHEN POURED INTO THE CELLS.
- AFTER UNPACKING THE DIFFUSER VENT CAPS AND PREPARING CELLS FOR RECEIPT OF ELECTROLYTE, FILL THE CELLS WITH ELECTROLYTE TO THE VISIBLE LEVEL MARKER ON THE PLASTIC JARS. (THIS WILL ALLOW SOME SPACE FOR SLOWLY ADJUSTMENTS IN SPECIFIC GRAVITY LATER.)
- CHECK THE SPECIFIC GRAVITY AT ROOM TEMPERATURE AND ADJUST TO 1.206 IF NECESSARY.

CAUTION: ALWAYS POUR ACID INTO WATER—NEVER WATER INTO ACID. POUR ACID SLOWLY, SINCE FAST POURING WILL GENERATE ENOUGH HEAT TO INDUCE VIOLENT BOILING. WEAR RUBBER GLOVES, RUBBER APRON, AND GOGGLES WHILE PREPARING ELECTROLYTE AND FILLING CELLS.

- INSTALLERS MUST TAKE SPECIAL CARE NOT TO CUT OR ABRADE THE DC CABLE INSULATION DURING INSTALLATION IN THE DUCTS BETWEEN THE BATTERY BANK AND DC EQUIPMENT RACKS.

NOTES:

- THE INTERCONNECTING CABLES AND INTERCELL STRAPS ARE PART OF THE BATTERY INTERCONNECTION KIT.
- TO PREVENT DAMAGE TO THE BATTERY CELL POSTS, INSTALL THE 1/0 AWG CABLES SO THAT THEIR WEIGHT WILL BE SUPPORTED BY THE CABLE DUCT OR LADDER. IN ADDITION, PULL THE CABLES SO THAT THERE IS NO SIGNIFICANT STRESS IN ANY DIRECTION ON THE POSTS.

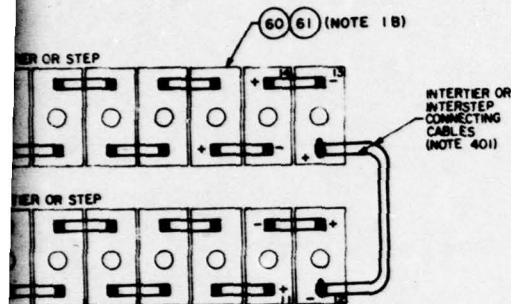
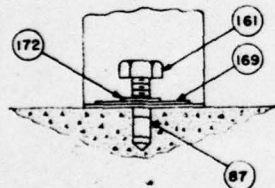
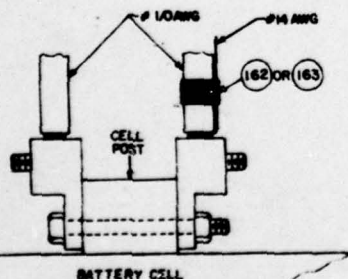


FIGURE 4
INTERCONNECTION DIAGRAM



DETAIL A

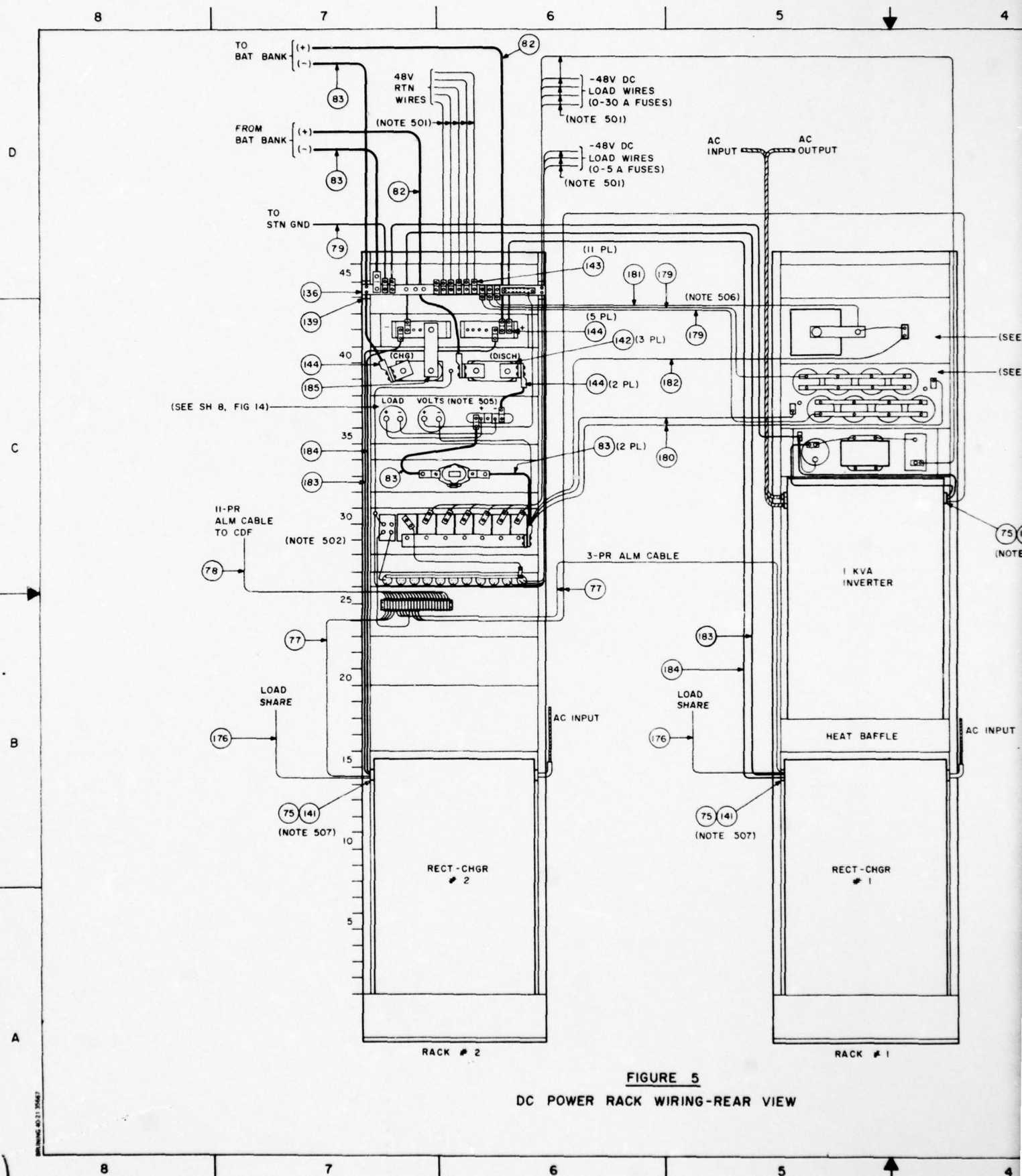
BATTERY RACK TO CONCRETE FLOOR MOUNTING



DETAIL B

BATTERY POST CONNECTOR
INSTALLATION

STD-MS-0018		REVISED BY		DATE	
DESIGNED BY L. H. LEE		D 50470		SCALE NONE	
APPROVED <i>H. M. Fisher</i>				SHEET 1 OF 1	



3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

501. LOAD DISTRIBUTION WIRE SIZES MUST BE CHOSEN BY LOAD CURRENT AND LOOP DISTANCE.
502. FUSE PANELS ARE INSTALLED AND WIRED WHEN LOCAL DISTRIBUTION IS USED. INSTALL AND WIRE PANELS TO MEET SITE REQUIREMENT.
503. OBSERVE MINIMUM BENDING RADII FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.
504. INSTALL NUMBER AND SIZE OF CABLES TO DISTRIBUTION PANELS IN RACK #2 TO LIMIT THE VOLTAGE DROP TO 0.35V.
505. FORM THE CABLE TO RELIEVE THE STRESS ON THE METER SHUNT.
506. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
507. PUNCH OUT THE 2-INCH KNOCKOUT IN THE COVER PLATE AND INSTALL THE BUSHING WITH LOCKNUT.

D

C

B

A

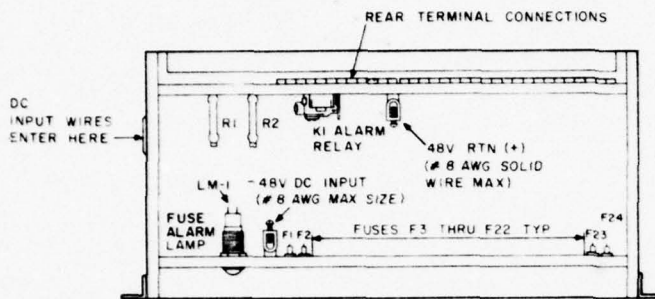
TEST NO. STD-MS-0018	SIZE YSCW NO. D 50470	DRAWING NO.
SHEET 5 OF 14	SCALE NONE	SHEET OF
DRAWN BY S.D.H.	APPROVED <i>[Signature]</i>	

2

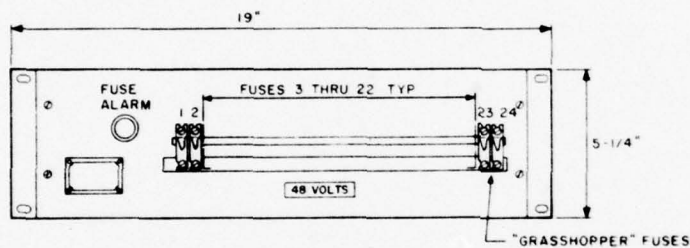
3

2

1



TOP VIEW



FRONT VIEW

FIGURE 6
SB-1523/FT FUSE PANEL LAYOUT

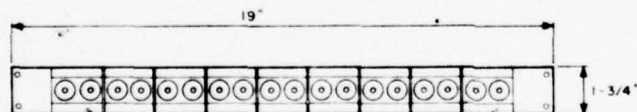


FIGURE 7
LORAIN TYPE 70 O-5A FUSE PANEL

TABLE 4
TYPE 70 FUSE DISTRIBUTION DATA TABLE

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN OR MFG'S NO.	TYPE
1			1-1/3	18 TO 14	WHITE	5920-00-539-6347	70
2			2	18 TO 12	ORANGE	5920-00-784-9217	70
3			3	14 TO 10	BLUE	5920-00-284-9218	70
4			5	14 TO 8	GREEN	5920-00-538-6205	70
5							
6							
7							

* SELECT THE WIRE SIZE BASED ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF < 0.35-V DC.

TABLE 5
"GRASSHOPPER" FUSE DISTRIBUTION

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG
1			1-1/3	18
2			2	18
3			3	14
4			5	14
5			7.5	12
6			10	12
7				

* SELECT THE WIRE SIZE BASED ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF < 0.35-V DC.

TABLE 6
"GRASSHOPPER" FUSE DISTRIBUTION

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG
1			1	18
2			2	18
3			3	14
4			3.5	14
5			5	14
6			10	12

* SELECT THE WIRE SIZE BASED ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF < 0.35-V DC.

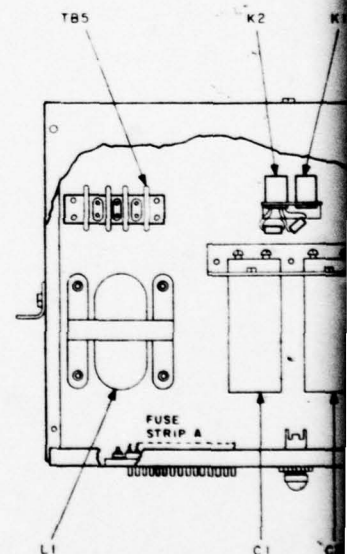


FIGURE 8
FUSE PANEL SB-1
(FILTERED, GM)

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

DISTRIBUTION DATA TABLE

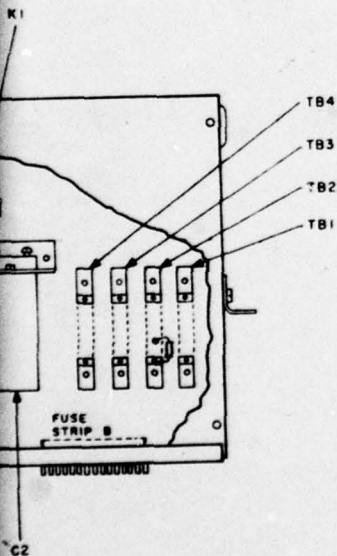
RECOMMENDED PIRE SIZE AWG*	BODY COLOR	NSN	TYPE
TO 14	WHITE	5920-00-156-0838	35B
TO 12	ORANGE	5920-00-556-9728	35L
TO 10	BLUE	5920-00-156-0837	35G
TO 8	GREEN	5920-00-122-3775	35H
TO 6		5920-00-857-8418	STE D270K7A11
TO 6		5920-00-624-2661	BURNED FTL0175

IN THE LOOP OF - 0.35-V DC.

TABLE 6
DISTRIBUTION DATA TABLE

RECOMMENDED PIRE SIZE AWG*	PIR COLOR	NSN	TYPE
18 TO 14	GRAY	5920-00-901-9936	QMT 1
18 TO 12	ORANGE	5920-00-857-8933	QMT 2
14 TO 10	BLUE	5920-00-081-5950	QMT 3
14 TO 10		5920-01-056-7256	QMT 3-1/2
14 TO 8	GREEN	5920-00-857-8417	QMT 5
12 TO 6	RED/WHITE	NSN	QMT 10

IN THE LOOP OF - 0.35-V DC.

8
3800/FTC
BMT FUSES)

STD-MS-0018 SHEET 8 OF 14	SIZE: PGM NO D 50470	SHIPPING NO
DRAWN BY: S. D. H.	SCALE: NONE	CHECKED BY
APPROVED: <i>H. J. Schen</i>		

2

3

2

1

8

7

6

5

TABLE

CABINET FUSE

FUSE NO.	RATING A	WIRE SIZE AWG (NOTE 703)	EQUIP
1	1 NORMAL	18	
2	2 NORMAL	18	
3	3 NORMAL	18	
4	5 NORMAL	16	
5	8 NORMAL	14	
6	10 NORMAL	14	
7	15 NORMAL	12	
8	5 SLO-BLO	16	
9	10 SLO-BLO	14	
10	15 SLO-BLO	12	

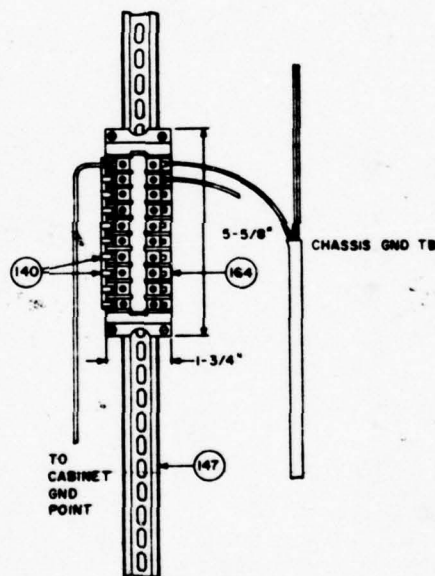
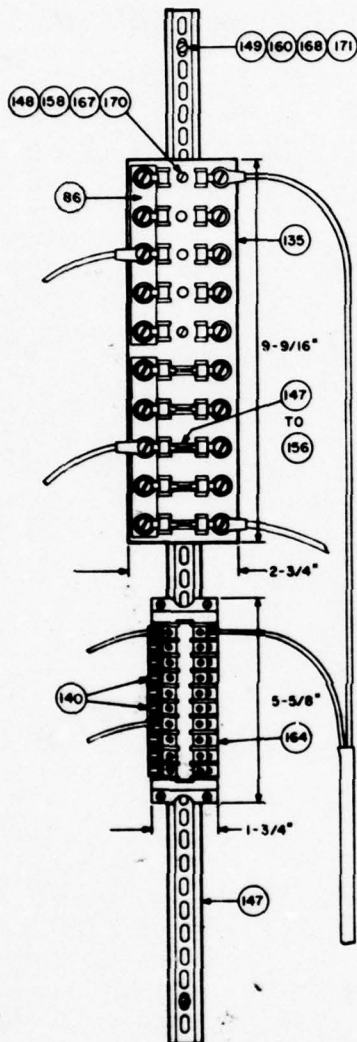
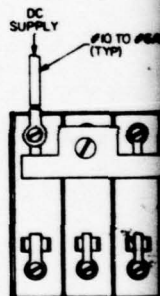


FIGURE 9

48V DC FUSE AND TERMINAL BLOCK
MOUNTING AND WIRING



BUSS FUSE

BUSS FUSE

FUSE NO.	RATING A	WIRE SIZE AWG (NOTE 703)	EQUIP
1	1	#18	
2	2	#18 TO 14	
3	3	#18 TO 14	
4	4	#18 TO 12	
5	5	#18 TO 12	
6			

REVISION			
ZONE	REV	DESCRIPTION	DATE

TABLE 7

FUSE ASSIGNMENTS			
WIRE	RAT LOAD, A (TYPICAL)	FUSE TYPE	WFR'S NO.
	0.5	5 AG	LITTLEFUSE 512001
	1.1	5 AG	LITTLEFUSE 512002
	2.0	5 AG	LITTLEFUSE 512003
	2.8	5 AG	LITTLEFUSE 512005
	6	5 AG	LITTLEFUSE 514008
	7	5 AG	LITTLEFUSE 514010
	9	5 AG	LITTLEFUSE 514015
	3.2	5 AG	LITTLEFUSE 523005
	7.5	5 AG	LITTLEFUSE 523010
	10.5	5 AG	LITTLEFUSE 523015
TOTAL			

NOTES:

701. MOUNT THE FUSE AND TERMINAL BLOCK ASSEMBLIES ON THE TOP SURFACE OF CABINET (FACING REAR).
702. IF THE EQUIPMENT REQUIRES A CHASSIS GROUND CONNECTION, A GROUNDING BLOCK CAN BE ADDED ON THE CHASSIS BELOW THE 40-1 RTN (+) BLOCK. A 3-CONDUCTOR POWER CORD IS REQUIRED, CONNECTED AS SHOWN.
703. SELECT THE WIRE SIZE BASED ON A MAXIMUM DROP FOR THE LOOP OF 0.35V DC.

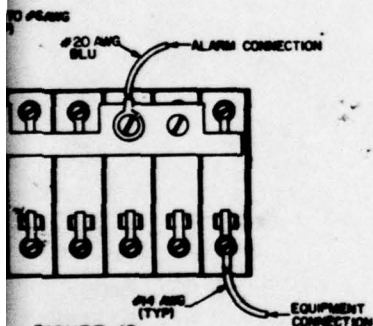


FIGURE 10

FUSE TERMINAL BLOCK

TABLE 8

FUSE BLOCK FUSE ASSIGNMENTS				
WIRE	RAT LOAD, A (TYPICAL)	FUSE TYPE	WFR	WFR
	0.5		0000-00-005-0515 0000-00-195-2330	BUSS LITTLEFUSE
	1.1		0000-00-206-7012 0000-01-207-0570	BUSS LITTLEFUSE
	1.9		0000-00-003-0093 0000-00-132-0090	BUSS LITTLEFUSE
	2.6		0000-00-006-3152	BUSS
	9.6		0000-01-007-5677	LITTLEFUSE

STD-MS-0018

REV 1

DATE 10-1-64

BY [Signature]

D 50470

DATE 10-1-64

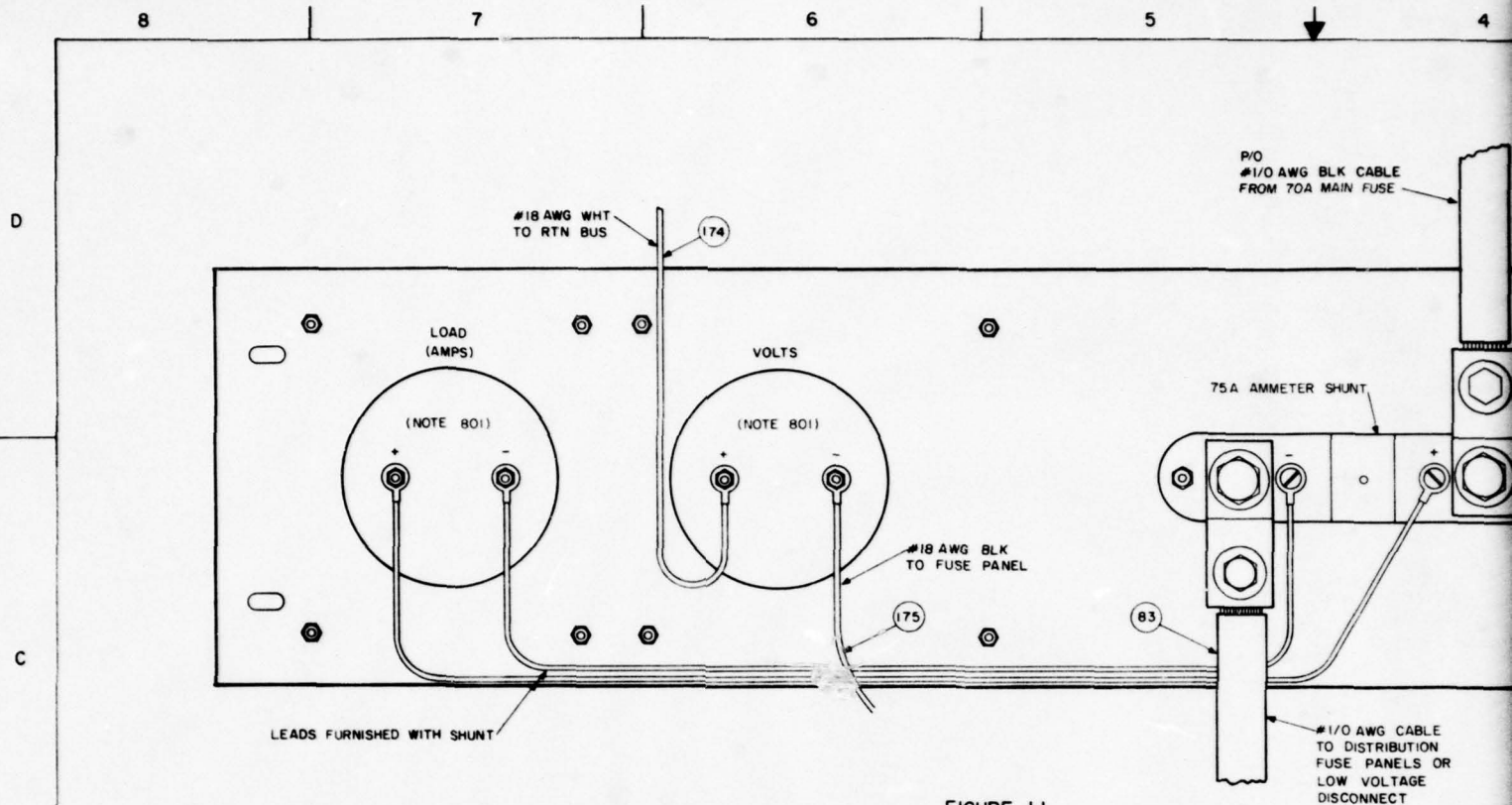


FIGURE 11
METER PANEL WIRING

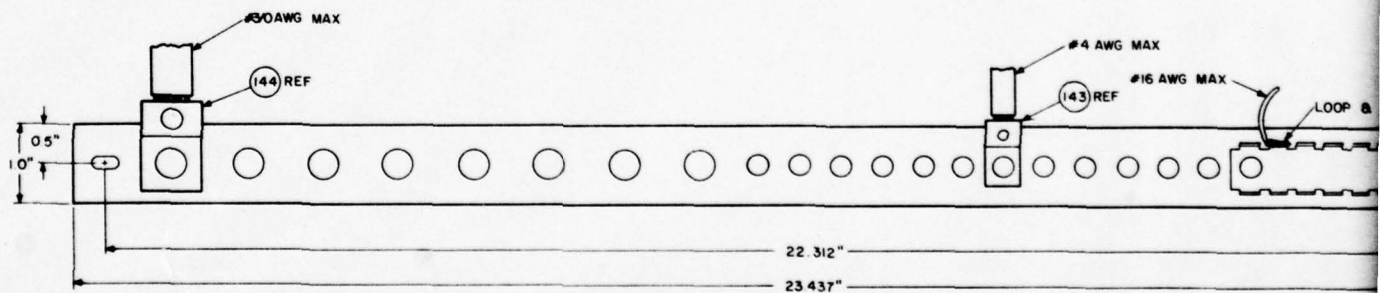
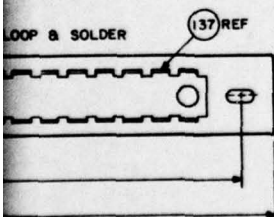
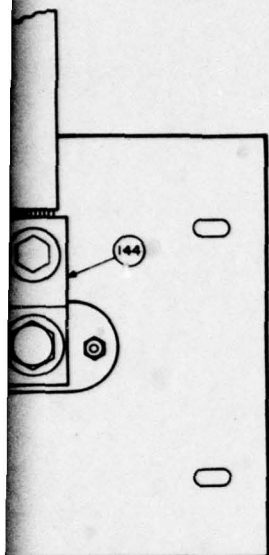


FIGURE 12
48V DC RTN BUS BAR WIRING

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

801. THE METER TERMINALS MAY BE REVERSED FROM THE WAY SHOWN. CONNECT TO THE CORRECT TERMINALS AS MARKED ON THE METER CASE.
802. FORM THE 1/0 AWG CABLES AND SECURE THEM TO RELIEVE STRESS ON THE SHUNT TO PREVENT DAMAGE.
803. USE BLACK-INSULATED WIRE FOR ALL (-) WIRING AND WHITE WIRE FOR ALL (+) METER AND SWITCH WIRING.



DRY NO. STD-MS-0018		SIZE D 50470	DRAWING NO.
SHEET 8 OF 14			
DRAWN BY G. VERDI			
APPROVED <i>H.M. Sola</i>		SCALE NONE	SHEET OF

D

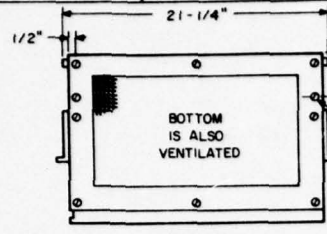
C

B

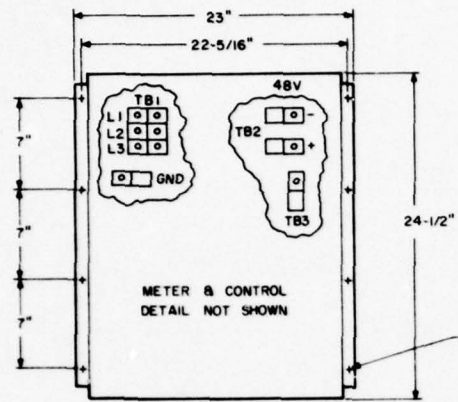
A

2

8 7 6 5 4



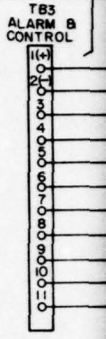
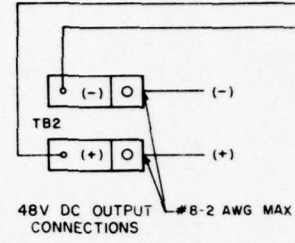
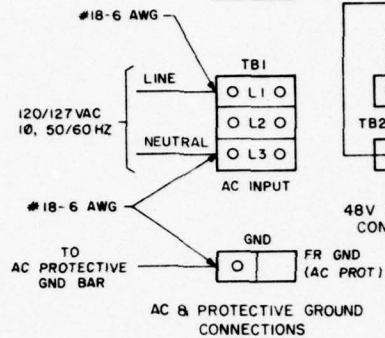
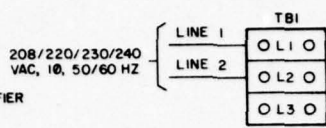
TOP VIEW



FRONT VIEW

DETAIL C

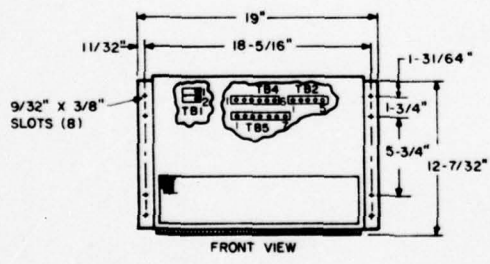
RL50F50 DIMENSIONS & LOCATION OF TERMINAL BOARDS



ALARM & CONTROL

DETAIL D

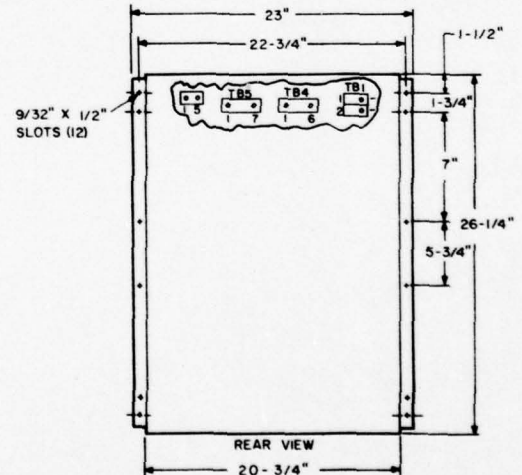
MAIN RECTIFIER-CHARGER AC & DC POWER, ALARM, & CONTROL CONNECTIONS



FRONT VIEW

DETAIL E

500VA, 60 HZ INVERTER DIMENSIONS & LOCATION OF TERMINAL BOARDS



REAR VIEW

DETAIL F

1KVA, 60 HZ INVERTER DIMENSIONS & LOCATION OF TERMINAL BOARDS

8 7 6 5 4

REVISIONS 40-21 20647

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

901. DISCONNECT AND TAPE THE LOCAL SENSE LEADS. CONNECT THE REMOTE BATTERY VOLTAGE SENSING WIRES.
902. CHECK TO ENSURE THAT THIS CONNECTION IS IN PLACE FOR LOCAL EQUALIZE SWITCHING. REFER TO THE RECTIFIER-CHARGER INSTRUCTION MANUAL.

D

DISCONNECT
(NOTE 901)

RG1 (+)
RB1 (-) } REMOTE VOLTAGE SENSING

LOAD SHARING

NO

COM

NC

NO

COM

NC

ALARMS (SEE SH M, FIG 20)

REMOE EQUALIZE
(STRAP FOR LOCAL CONTROL)
(NOTE 902)

CONTROL CONNECTIONS

C

POWER,

B

A

TEST NO	STD-MS-0018	SIZE/FORM NO	D 50470	SHIPPING NO
SHEET	8 OF 14	SCALE	NONE	SHEET OF
DRAWN BY	G. VERDI			
APPROVED	<i>H. M. Selin</i>			

2

3

2

1



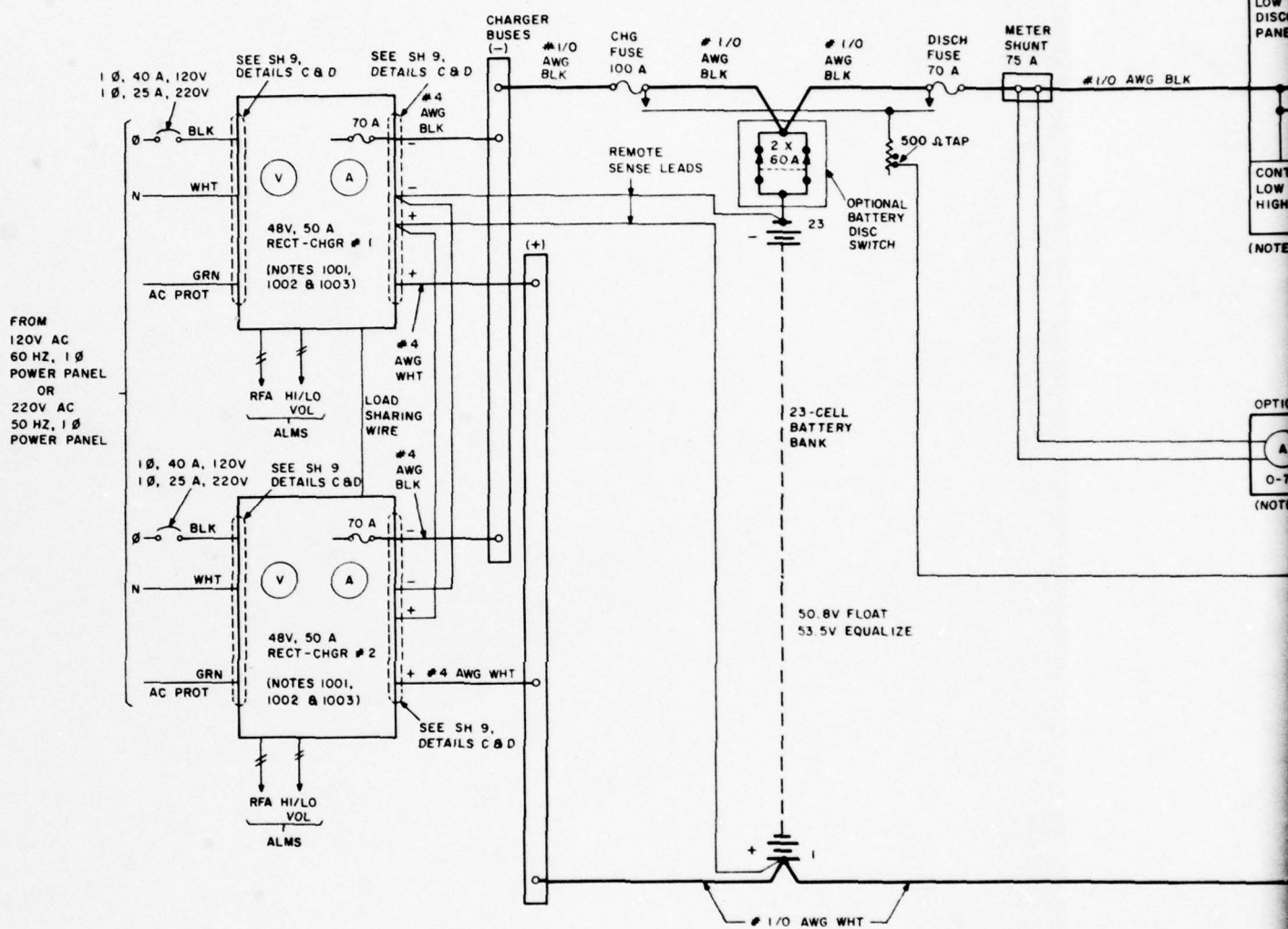
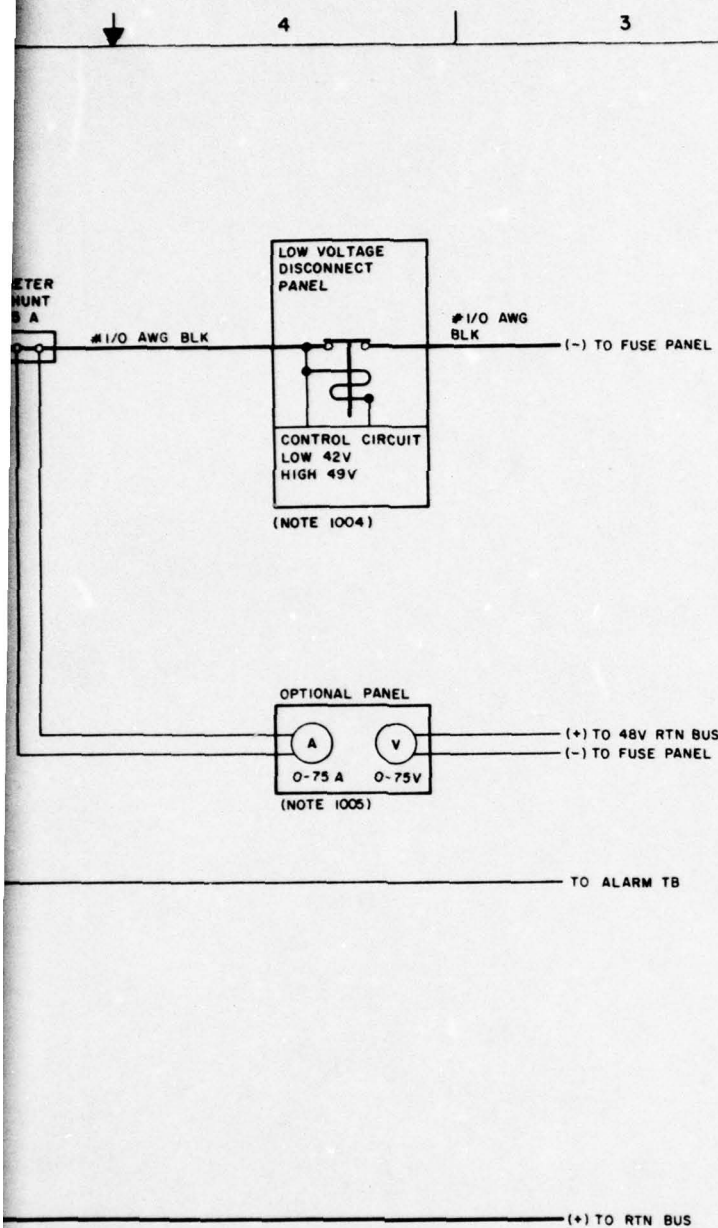


FIGURE 13

SCHEMATIC DIAGRAM OF -48V, 50A BASIC BATTERY FACILITY



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

LEGEND:

RFA - RECTIFIER FAIL ALARM
 FA - FUSE ALARM
 H/L, HI/LO - HIGH OR LOW VOLTAGE ALARM
 RB - REMOTE BATTERY SENSE LEAD (-)
 RG - REMOTE GROUND SENSE LEAD (+)
 # - NUMBER OF CONDUCTORS

NOTES:

1001. THE RECTIFIER-CHARGERS ARE FILTERED FOR WIDEBAND ELECTRICAL NOISE NOT TO EXCEED 200 mVp-p WITH THE BATTERY BANK CONNECTED AND A RESISTIVE LOAD. THEY ALSO CONTAIN AUTOMATIC CURRENT LIMITING CIRCUITS TO PREVENT SHUTDOWN ON TEMPORARY OVERLOADS.
1002. DC POWER EQUIPMENT METAL WORK MUST BE KEPT ISOLATED FROM SIGNAL GROUND CONDUCTORS TO PREVENT CONDUCTION OF ELECTRICAL NOISE TO COMMUNICATIONS EQUIPMENT.
1003. RECOMMENDED AC INPUT WIRING AND CIRCUIT BREAKER PROTECTION FOR THE RECTIFIER CHARGERS IS: 120 VAC, 1Ø, 60HZ, (8 AWG WIRING AND 40 AMP BREAKER); 220 VAC, 1Ø, 50HZ, (Ø10 AWG WIRING AND 25 AMP BREAKER).
1004. THE LO-VOLTAGE DISCONNECT PANEL IS ONLY RECOMMENDED FOR USE IN THE 8-HOUR UNMANNED INSTALLATIONS.
1005. THE LOAD VOLTAGE CAN BE OBTAINED FROM THE RECTIFIER-CHARGER VOLTMETERS. THE LOAD CURRENT IS THE SUM OF THE RECTIFIER-CHARGER AMPMETER READINGS, WHEN THE BATTERY IS FULLY CHARGED.

BATTERY FACILITY

IDENT NO. STD-MS-0018		SIZE / FSCM NO. D 50470	DRAWING NO.
SHEET 10 OF 14			
DRAWN BY S. D. H.			
APPROVED <i>[Signature]</i>		SCALE NONE	SHEET OF

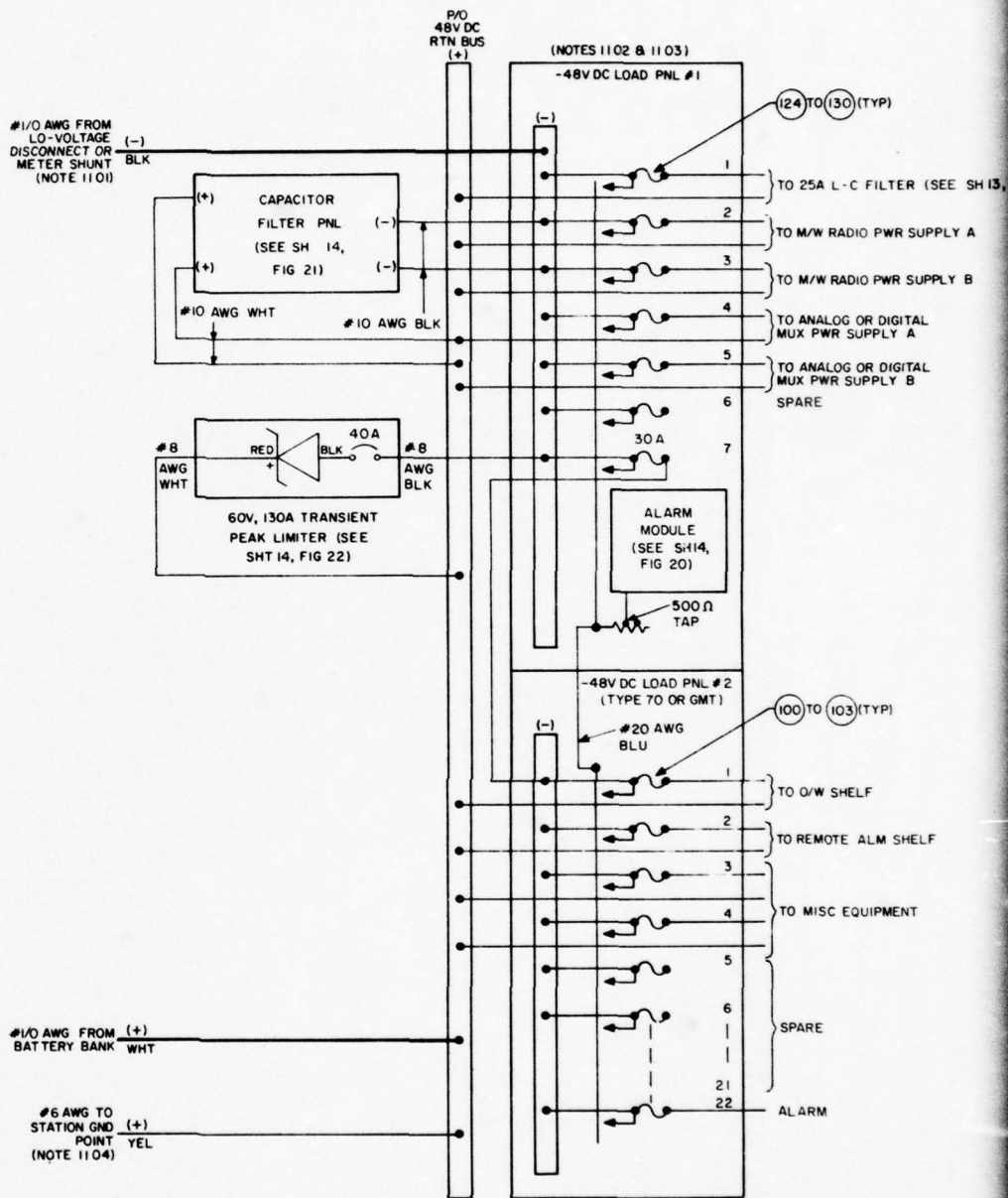


FIGURE 14
LOCAL FUSE DISTRIBUTION SCHEMATIC

FIG 18)

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

- 1101. THE LO-VOLTAGE DISCONNECT PANEL IS ONLY RECOMMENDED FOR USE IN THE 8-HOUR UNMANNED INSTALLATION.
- 1102. ACTUAL FUSING AND DISTRIBUTION WIRE SIZES WILL DEPEND ON LOADS AND LOOP DISTANCE TO THE EQUIPMENT BEING SUPPLIED.
- 1103. THE DISTRIBUTION SHOWN IS TYPICAL FOR A MICROWAVE TERMINAL STATION AND DOES NOT REPRESENT ANY ACTUAL DISTRIBUTION. THE NUMBER AND TYPE OF LOAD PANELS USED MUST BE CHOSEN FOR SPECIFIC REQUIREMENTS.
- 1104. THE DC REFERENCE GROUND CONDUCTOR SHOULD BE CONNECTED TO THE MAIN STATION GROUND POINT (IN GROUND BOX) OR AS CLOSE TO THE EXTERIOR EARTH GROUND ELECTRODE NETWORK AS POSSIBLE.

D

C

B

A

DESIGN NO. STD-MS-0018	SHEET NO. 11 OF 14	SIZE/TECH NO. D 50470	DRAWING NO.
DRAWN BY L. H. LEE	SCALE NONE	SHEET OF	
APPROVED <i>Ami Saha</i>			

2

3

2

1

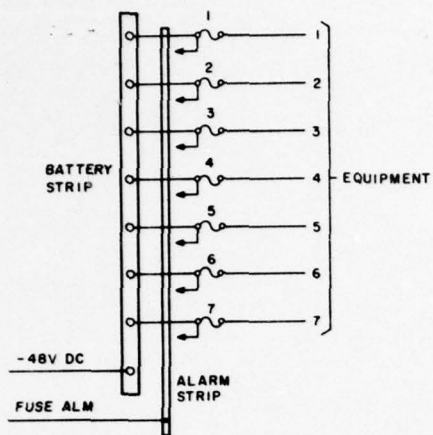


FIGURE 15
BUSS FUSE BLOCK SCHEMATIC

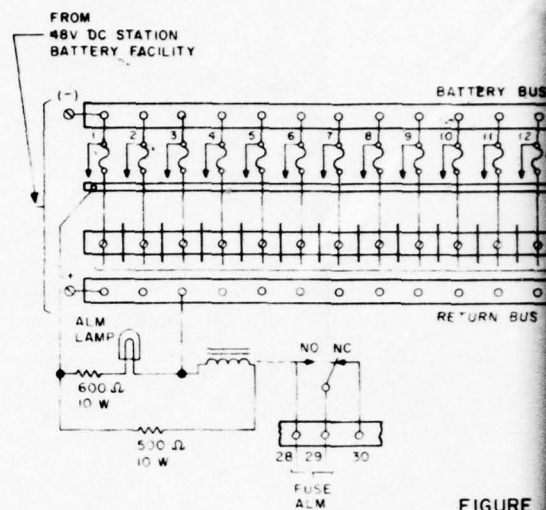
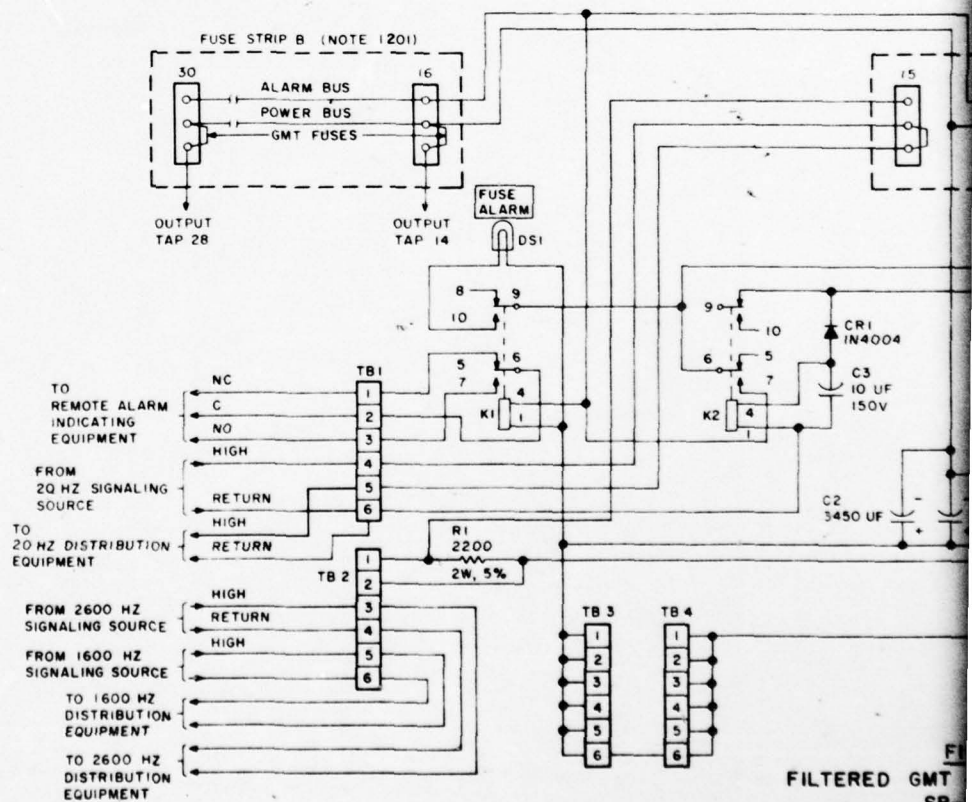


FIGURE
SB-1523/FT FUSE P

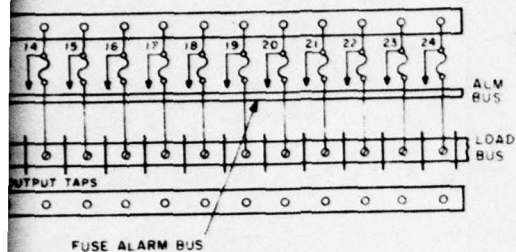


3

2

1

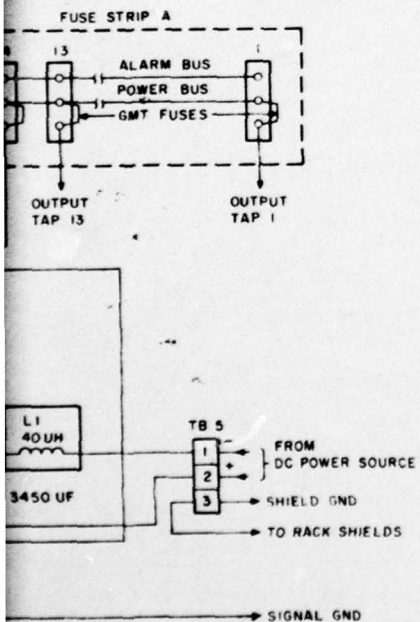
REVISION			
ZONE	NO.	DESCRIPTION	DATE



NOTES:

1201. FUSE STRIP B IS USED ONLY IN THE 30 FUSE (STELMA FP-30) CONFIGURATION.
1202. FOR MORE INFORMATION REFER TO TM 11-5805-666-14P.

EL SCHEMATIC



WIRE 17
FUSE PANEL SCHEMATIC
00/FTC
(1202)

STD-MS-0018		DRAWING NO.	
SHEET 18 OF 14		D 50470	
DRAWN BY: S D H		SCALE: NONE	
APPROVED: <i>H M Sch</i>		SHEET OF	

12

3

2

1

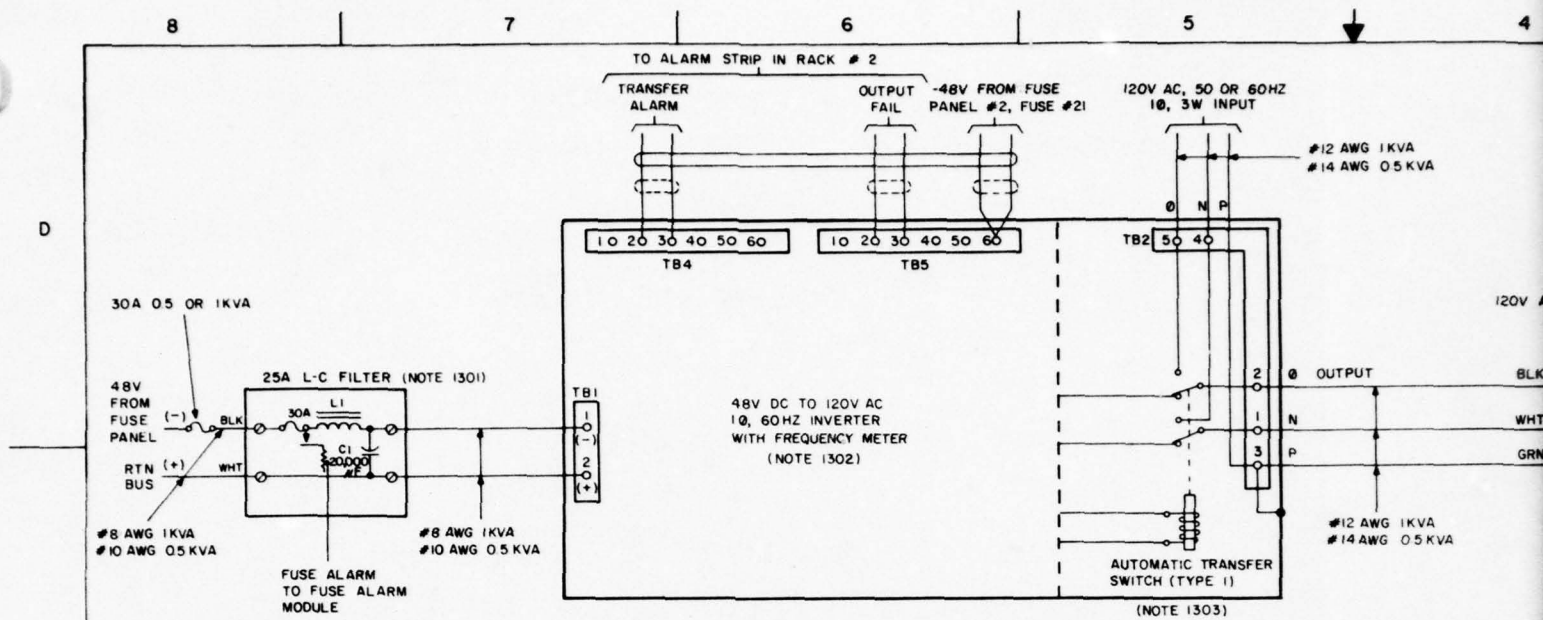
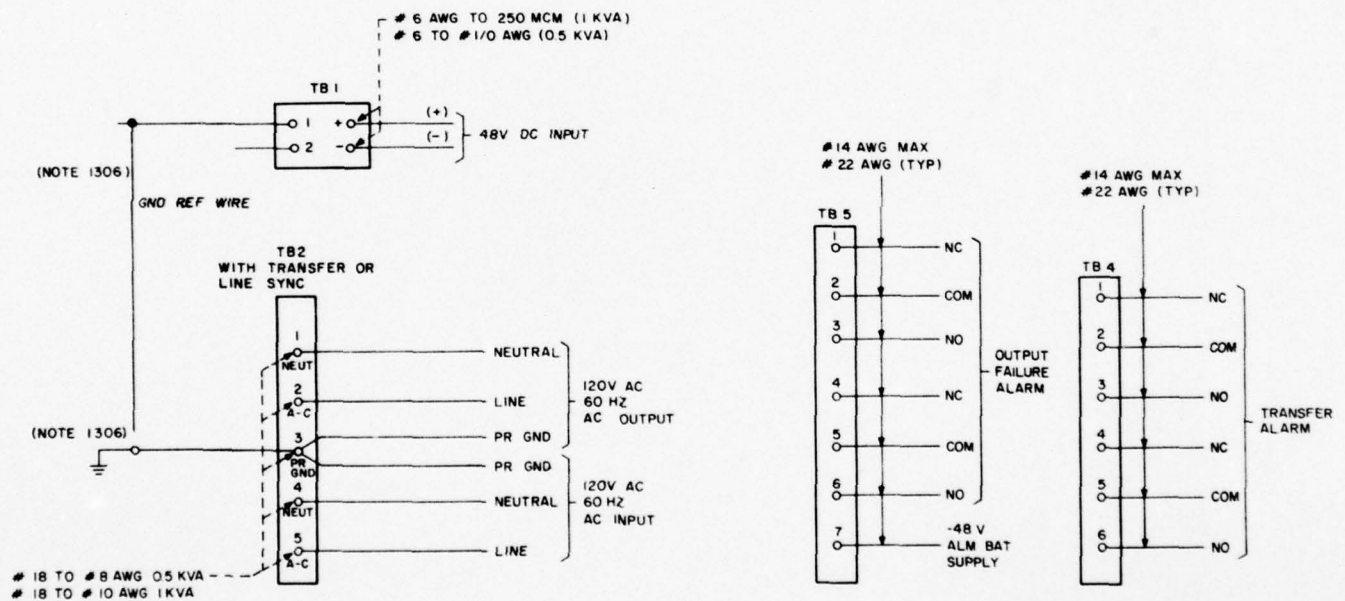


FIGURE 18

INVERTER & AC POWER PANEL WIRING



DETAIL G

0.5 & 1KVA INVERTER AC & DC POWER & ALARM CONNECTIONS

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

1301. AN L-C DECENTRALIZING FILTER IS NOT REQUIRED WITH THE 500VA INVERTER.
1302. A SYNCHRONIZER CIRCUIT CAN BE USED IF THE INVERTER FREQUENCY MATCHES THE PRIMARY POWER.
1303. THE AUTOMATIC TRANSFER SWITCH IS FACTORY INSTALLED AS PART OF THE INVERTER.
1304. THE INVERTER POWER PANELS SHOULD BE INCLUDED IN THE EIP.
1305. THE INVERTER 120-V AC POWER OUTLET STRIP IS IN ADDITION TO THE REGULAR UTILITY POWER OUTLET STRIP PROVIDED AS PART OF THE CABINET. THE TWO STRIPS CAN BE MOUNTED ON OPPOSITE SIDES, LABEL EACH.
1306. IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
1307. THE TOTAL LOAD MUST BE LIMITED TO THE MAXIMUM CAPACITY OF THE INVERTER.

D

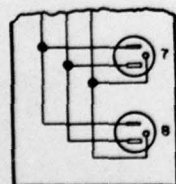
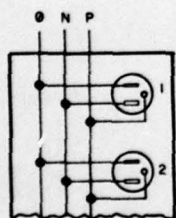
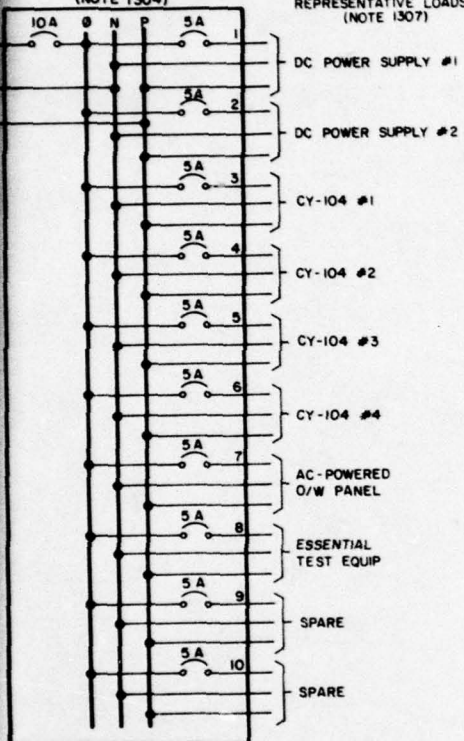
C

B

A

AC, 10, 3W, INVERTER AC POWER PANEL FOR 1KVA OR LARGER INVERTER

(NOTE 1304)

REPRESENTATIVE LOADS
(NOTE 1307)

(NOTE 1305)

FIGURE 19

INVERTER 120V AC POWER
OUTLET STRIP IN CABINET

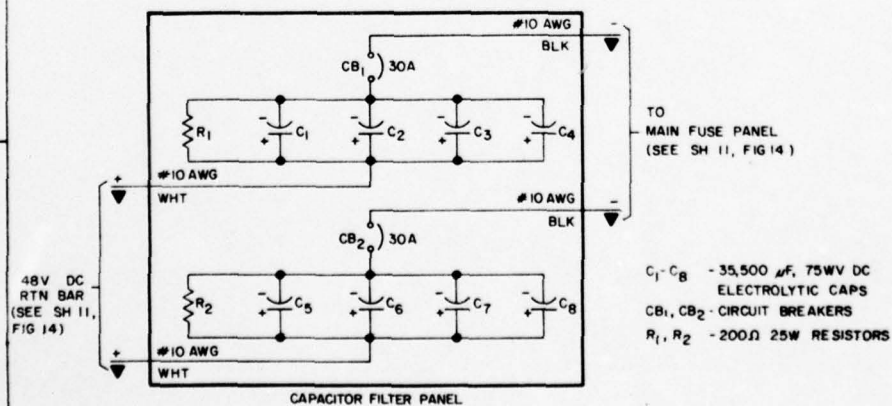
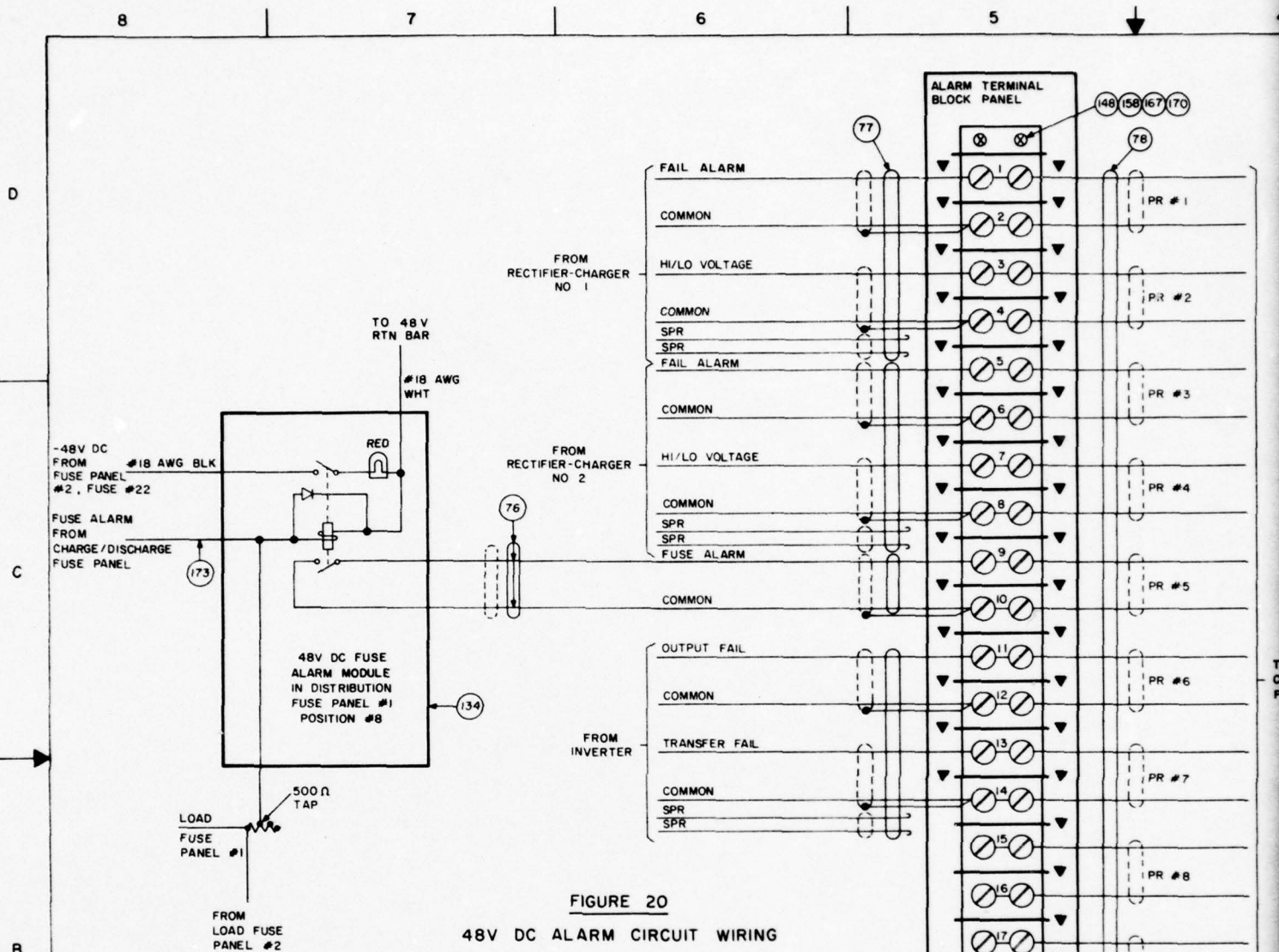
PROJECT NO. STD-MS-0018	SHEET NO. 13 OF 14	DESIGNER G. VERDI	SCALE NONE	DATE APR 1961	APPROVED [Signature]
-----------------------------------	------------------------------	-----------------------------	----------------------	-------------------------	--------------------------------

2

3

2

1



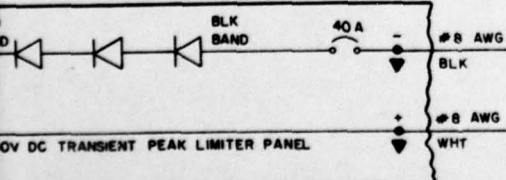
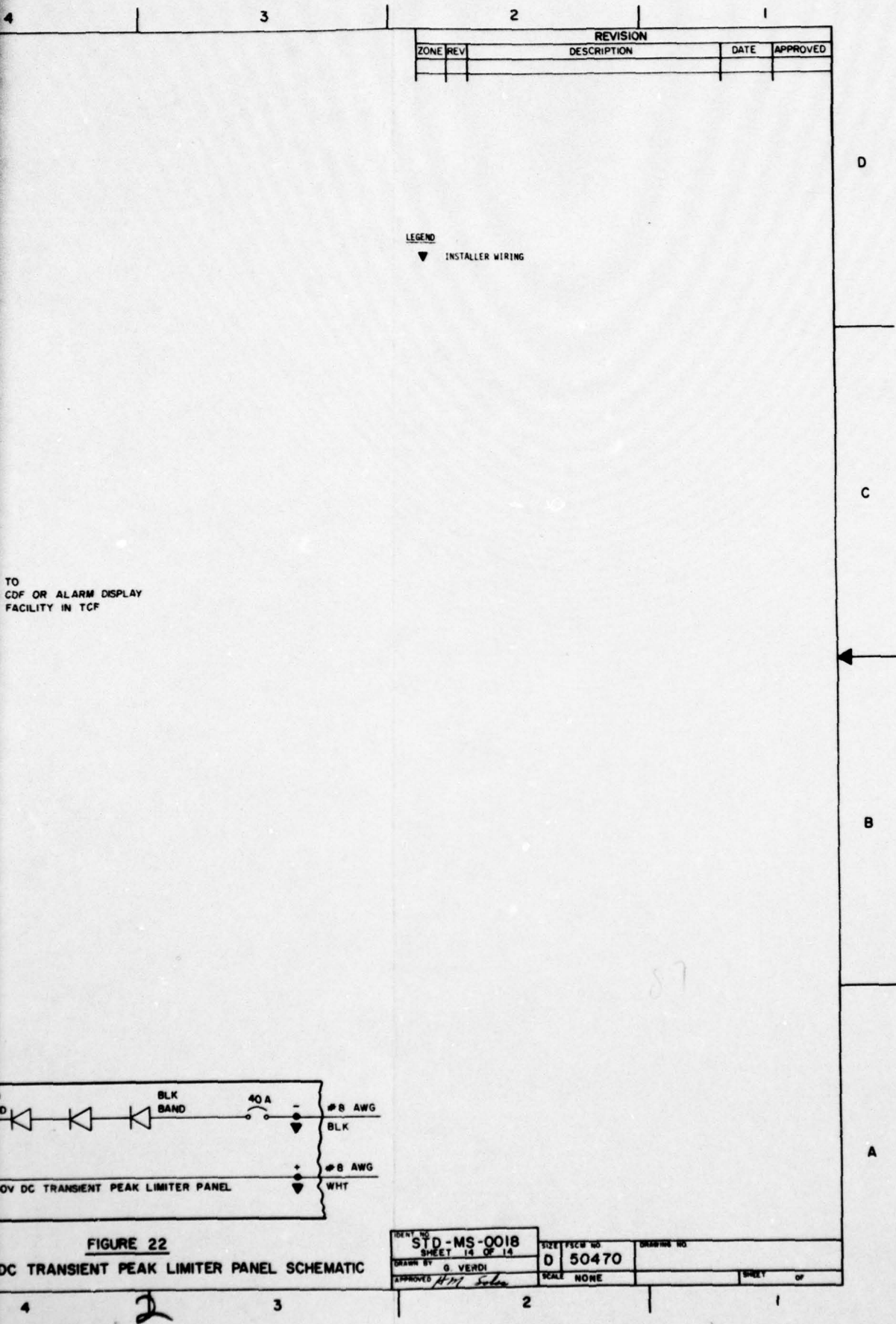


FIGURE 22
DC TRANSIENT PEAK LIMITER PANEL SCHEMATIC

IDENT NO STD-MS-0018		SIZE/FSCM NO D 50470	DRAWING NO
SHEET 14 OF 14		SCALE NONE	SHEET OF
DRAWN BY G. VERDI		APPROVED <i>[Signature]</i>	

D

C

B

A

197	23985E	WIRE, ELEC, TW, STR, 6 AWG, YEL, INS, 600V	NSNR	FT	
196	03518W	WIRE, ELEC, TW, STR, 6 AWG, BLK, INS, 600V	6145-00-923-2220	FT	
195	03501C	WIRE, ELEC, TW, STR, 6 AWG, WHT, INS, 600V	6145-00-943-0728	FT	
194	03570N	WIRE, SINGLE COND, 8 AWG BLK, SOL, INS, 600V	6145-00-470-8255	FT	
193	06535A	WIRE, SINGLE COND, 8 AWG WHT, SOL, INS, 600V	6145-00-479-0042	FT	
192	03538G	WIRE, SINGLE COND, 10 AWG BLK, SOL, INS 600V	6145-00-990-2999	FT	
191	03507W	WIRE, SINGLE COND, 10 AWG WHT, SOL, INS 600V	6145-00-990-3000	FT	
190	09004N	WIRE, ELEC, TW, #12 AWG, YEL, SOL, INS, 600V	NSNR	FT	
189	03509A	WIRE, 14 AWG, WHT, SOL, 600V, INS	6145-00-050-7407	FT	
188	03540K	WIRE, 14 AWG, BLK, SOL, 600V, INS	6145-00-050-7405	FT	
187	11672A	WIRE, ELEC, TW, 18 AWG RED, SOL, INS, 600V	6145-00-089-6811	FT	
186	23193Y	WIRE, ELEC, TW, 18 AWG BLK, STR, INS	6145-00-524-9130	FT	
185	09217J	WIRE, ELEC, TW, 18 AWG WHT, STR, INS	6145-00-681-8374	FT	
184	16954C	WIRE, ELEC, TW 20 AWG BLU STR, BELDEN 8919-13	NSNR	FT	
183	00586C	WASHER, LOCK, SPLIT, STEEL, 3/8"	5310-00-637-9541	EA	
182	10231A	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, 1/4"	5310-00-808-5381	EA	
181	00483J	WASHER, LOCK, SPLIT, STEEL, #10	5310-00-045-3296	EA	
180	09019J	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, #8	5310-00-045-3299	EA	
179	19635Z	WASHER, LOCK, EXT TOOTH, BRONZE, 1/4"	5310-00-942-5109	EA	
178	08658A	WASHER, FLAT, STEEL, 3/8"	5310-00-087-7493	EA	
177	06124L	WASHER, FLAT, BRASS, 1/4"	5310-00-754-4337	EA	
176	14518W	WASHER, FLAT, STEEL, CAD PLTD, 1/4"	5310-00-141-1795	EA	
175	00488D	WASHER, FLAT, STEEL, #10	5310-00-167-0834	EA	
174	00487C	WASHER, FLAT, STEEL, CAD PLTD, #8	5310-00-167-0833	EA	
173	24830C	TRANSIENT PEAK LIMITER PANEL, 23" X 7" 600V, 130A IAW DMG STD-MS-0023	NSNR	EA	
172	23199Z	TERMINAL STRIP, 22 POSITIONS, CURTIS 1522 ST	NSNR	EA	
171	21956A	TERMINAL BLOCK, SQUARE D, TYPE 9080-CA-10	5820-00-J01-3310	EA	

ITEM	SML	DESCRIPTION	NSN	UI	QTY
------	-----	-------------	-----	----	-----

LIST OF MATERIALS

170	13561K	TAPE, INSULATING, ELEC, BLACK 3/4" X 108"	5970-00-816-6056	RL	
169	23204E	TAPE, INS, ELEC, WHITE, 3/4" X 216", 1500 V	5970-00-295-8161	RL	
168	00230J	SCREW, CAP 3/8-16 X 1-1/2", HEX HD STEEL	5305-00-022-7798	EA	
167	10130J	SCREW, MACH, STEEL, CAD PLTD, 1/4-20 X 1"	5305-00-988-1727	EA	
166	19640Y	SCREW, CAP, BRASS, 1/4-20 X 5/8"	5305-00-935-7581	EA	
165	13953E	SCREW, MACH, 12-24 X 3/4", PAN HEAD	5305-00-639-7970	EA	
164	24423C	SCREW, MACH, 10-32 X 1" LG, PAN HEAD	5305-00-059-7815	EA	
163	09098X	SCREW, MACH PAN HD STEEL CAD PLTD, 8-32 X 1"	5305-00-206-3713	EA	
162	21846A	PROTECTIVE SCREEN 23" X 36" LORAIN 4141-406	NSNR	EA	
161	21827D	PANEL, TERM, 23" X 3-1/2", LORAIN 4341-514	5975-00-J01-3530	EA	
160	20978B	PANEL, BLANK, 23" X 8-3/4", LORAIN 3535-102	NSNR	EA	
159	20960E	PANEL, BLANK, 23" X 7", LORAIN 3534-103	5975-00-J01-3513	EA	
158	20979C	PANEL, BLANK, 23" X 5-1/4", LORAIN 3533-106	5975-00-J01-3512	EA	
157	20961F	PANEL, BLANK, 23" X 3-1/2", LORAIN 3532-112	NSNR	EA	
156	20942W	PANEL, BLANK, 23" X 1-3/4", LORAIN 3531-106	NSNR	EA	
155	24414E	PANEL, AC OUTLET, 23", IAW DMG STD-MS-0017	NSNR	EA	
154	00558H	NUT, PLAIN, HEX, STEEL, CAD PLTD, 1/4-20	5310-00-285-1650	EA	
153	07675L	NUT, PLAIN, HEX, STEEL, CAD PLTD, #8-32	5310-00-550-2490	EA	
152	09727C	NUT, HEX, BRASS, 1/4-20	5310-00-141-3034	EA	
151	23942F	MOUNTING CHANNEL, SQUARE D, TYPE 1828-C22X38	NSNR	EA	
150	21718E	LUG, TERMINAL, #18-14 AWG, TAB R8B64	NSNR	EA	
149	21719F	LUG, TERMINAL, #8 AWG, TAB STAKON RD367	NSNR	EA	
148	07540B	LUG, TERMINAL, #20 AWG, TAB RAB63	5940-00-557-1629	EA	
147	21955Z	LUG, TERMINAL, #10 AWG, TAB RC10-14	5940-00-866-2586	EA	
146	21720F	LUG, TERMINAL, #22 AWG, TAB STAKON, RA-1123	5940-00-948-8847	EA	
145	10397B	LUG, LOCKITE, #4 AWG, TAB #31007	5940-00-636-5015	EA	
144	21711H	LUG KIT, #1/0 AWG-350 MCM, LORAIN 4835-527	5180-00-J01-3518	EA	
143	21824A	LUG KIT, #4-3/0 AWG, LORAIN 4835-526	5180-00-J01-3523	EA	
142	22210A	LUG KIT, #8-2 AWG LORAIN 4835-524	NSNR	EA	
141	21708F	LUG KIT, #14-4 AWG, LORAIN 4835-523	5180-00-J01-3522	EA	
140	21710G	LUG ADAPTER, ANGLE, LORAIN 3627-531	5940-00-J01-3498	EA	
139	02622D	LOCKNUT, CONDUIT, 2", TAB #146	5975-00-642-7263	EA	
138	23922H	KEY SWITCH, 3C, LORAIN 2523-314	NSNR	EA	
137	21726B	JUMPER, SQUARE D, TYPE 9080-JCA-6	NSNR	EA	
136	233130	INSULATING MOUNTING ASSEMBLY 23" X 4", LORAIN 4133-036	NSNR	EA	
135	24994B	HEAT-SHRINK INSULATOR, 4/0-400 MCM, TAB H540-400	NSNR	PKG	
134	21695C	HEAT BAFFLE, 23" X 3-1/2", LORAIN 4133-024	NSNR	EA	
133	21712W	GROUND TERMINAL STRIP, LORAIN 4835-530	5940-00-J01-3520	EA	
132	22207W	GROUND BAR, COPPER, 700A, 23" MTG, LORAIN 4361-041	NSNR	EA	
131	21950E	FUSE PANEL BUS BAR, 2 PNLS, LORAIN 3476-102	NSNR	EA	
130	21729E	FUSE BLOCK, 10 POLES, LITTLEFUSE 556010	NSNR	EA	
129	22170Y	FUSE LINK, 200A, 250V, LORAIN 2484-641	NSNR	EA	
128	22107H	FUSE LINK, 150A, 250V, LORAIN 2484-637	NSNR	EA	
127	24826Z	FUSE, LINK, 70A, 250V, LORAIN 2484-625	5920-00-067-6783	EA	
126	21697E	FUSE, NON-TYPE, 50A, LORAIN 2483-523	NSNR	EA	
125	21698F	FUSE, NON-TYPE, 30A, LORAIN 2483-515	NSNR	EA	
124	18043Q	FUSE, TYPE 70 (INDICATING ALARM) 1-1/3A, LORAIN 2486-208	5920-00-904-2671	EA	
123	24047A	FUSE, 6A, 250V, LORAIN 2483-505	NSNR	EA	
122	24440K	FUSE, 5AB, SLO-BLO, 15A, LITTLEFUSE 523015	NSNR	EA	
121	21723W	FUSE, 5AB, SLO-BLO, 10A, LITTLEFUSE 523010	NSNR	EA	
120	24439H	FUSE, 5AB, SLO-BLO, 5A, LITTLEFUSE 523005	NSNR	EA	
119	24438G	FUSE, 5AB, NORMAL, 15A, LITTLEFUSE 514015	NSNR	EA	
118	24437F	FUSE, 5AB, NORMAL, 10A, LITTLEFUSE 514010	NSNR	EA	
117	24436E	FUSE, 5AB, NORMAL, 8A, LITTLEFUSE 512008	NSNR	EA	
116	21724Z	FUSE, 5AG, NORMAL, 5A, LITTLEFUSE 512005	5920-00-280-3469	EA	
115	24435D	FUSE, 5AG, NORMAL, 3A, LITTLEFUSE 512003	NSNR	EA	
114	24434C	FUSE, 5AG, NORMAL, 2A, LITTLEFUSE 512002	NSNR	EA	
113	24433B	FUSE, 5AG, NORMAL, 1A, LITTLEFUSE 512001	NSNR	EA	
112	24449G	FUSE, 3AB, 15A, 250 V, LITTLEFUSE 314015	NSNR	EA	
111	24448F	FUSE, 3AB, ALARM, 5A, LITTLEFUSE	5920-01-007-5677	EA	
110	24447E	FUSE, 3AB, ALARM, 4A, BUSS	5920-00-806-3152	EA	
109	24446D	FUSE, 3AB, ALARM, 3A, LITTLEFUSE	5920-00-133-4898	EA	
108	24445C	FUSE, 3AB, ALARM, 3A, BUSS	5920-00-503-4843	EA	
107	24444B	FUSE, 3AB, ALARM, 2A, LITTLEFUSE	5920-01-007-5676	EA	
106	24443A	FUSE, 3AB, ALARM, 2A, BUSS	5920-00-295-7013	EA	
105	24442Z	FUSE, 3AB, ALARM, 1A, LITTLEFUSE	5920-00-195-2330	EA	
104	24441J	FUSE, 3AB, ALARM, 1A, BUSS	5920-00-665-0515	EA	
103	24429W	FUSE, 1/4A WITH 10 OHM RESISTOR, LORAIN 2486-203	NSNR	EA	
102	23988H	FUSE, INDICATING, TYPE 70, 5A	5920-00-538-6205	EA	
101	24428H	FUSE, INDICATING, TYPE 70, 3A	5920-00-284-9218	EA	
100	24427G	FUSE, INDICATING, TYPE 70, 2A	5920-00-284-9217	EA	
99	24426F	FUSE, INDICATING, TYPE 70, 1-1/3A	5920-00-539-6347	EA	
98	24432A	FUSE, GRASSHOPPER, 10A, BURNDY F10115	5920-00-624-2661	EA	
97	24431Z	FUSE, GRASSHOPPER, 7-1/2A, GTE 027087A11	5920-00-857-8418	EA	
96	17237Z	FUSE, GRASSHOPPER, 5A, BUSSMAN 35H	5920-00-122-3775	EA	

ITEM	SML	DESCRIPTION	NSN	UI	QTY
------	-----	-------------	-----	----	-----

LIST OF MATERIALS

4

3

2


1

REVISION			
ZONE	REV	DESCRIPTION	DATE

FUSE, GRASSHOPPER, 3A, BUSSMAN 35G	5920-00-156-0837	EA	
FUSE, GRASSHOPPER, 2A, BUSSMAN 35L	5920-00-556-9728	EA	
FUSE, GRASSHOPPER, 1-1/3A, BUSSMAN 35B	5920-00-156-0838	EA	
FUSE, GMT 10, 10A, LORAIN 2486-112	NSNR	EA	
FUSE, GMT 5, 5A	5920-00-857-8417	EA	
FUSE, GMT 3-1/2, 3-1/2A	5920-01-056-7256	EA	
FUSE, GMT 3, 3A	5920-00-081-5958	EA	
FUSE, GMT 2, 2A	5920-00-857-8933	EA	
FUSE, GMT 1, 1A	5920-00-901-9936	EA	
EXPANSION, SHIELD, 3/8" - 16, MACH BOLT	5340-00-754-4560	EA	
COPPER STRIP, 1/2" W, 5" L, 1/32" THICK	NSNR	EA	
CONNECTOR, TWO-WAY, TAB 32511	5940-00-257-1215	EA	
COMPOUND, SEALING, NONHARDENING PERMAGUM	NSNR	EA	
CAPACITOR FILTER PANEL, 23" X 7", 1AM DNG STD-MS-0003	NSNR	EA	
CABLE, 3-COND, STR, INS, 16 AWG, BELDEN 9219	6145-00-584-7974	FT	
CABLE, 2-COND, STR, INS, 16 AWG, BELDEN 8471	6145-00-689-9338	FT	
CABLE, SINGLE COND, STR, INS, 600V, #4/0 AWG, BLK	6145-00-050-9079	FT	
CABLE, SINGLE COND, STR, INS, 600V, #4/0 AWG, WHT	NSNR	FT	
CABLE, SINGLE COND, STR, INS, 600V, #2 AWG, WHT	6145-00-184-3875	FT	
CABLE, SINGLE COND, #2 AWG, BLK, STR	6145-00-051-9790	FT	
CABLE, 11-PR, #22 AWG, BELDEN 8765	6145-00-081-1049	FT	
CABLE, 3-PR, #22, STR, BELDEN 9745	NSNR	FT	
CABLE, 1-PR, #20 AWG, STR, INS	6145-00-845-5206	FT	
BUSHING, 2" OD, CHASE NIPPLE, TAB 1947	5975-00-710-0876	EA	
BUS BAR, TERM PANEL, LORAIN 3425-194	NSNR	EA	
SWITCH, SAFETY 2-POLE, 240V, 200A, SQ D Q0260MATS	NSNR	EA	
SHUNT & CONTACTOR PANEL ASSY, 100-A, CONSISTING OF:			
CONTACTOR, LORAIN 4377-009	NSNR	EA	
PANEL, MOUNTING, LORAIN 3532-162	NSNR	EA	
METER SHUNT, 100-A, LORAIN 2982-712	5905-00-758-5449	EA	
RECTIFIER-CHARGER, 48-V DC, 100-A; 3-Ø, 380-V AC, 50/60 HZ; LORAIN RHM100C50	NSNR	EA	
RECTIFIER-CHARGER, 48-V DC, 100-A; 3-Ø, 208-V AC, 60 HZ; LORAIN RHM100D50	NSNR	EA	
RACK, 23" X 7", LORAIN 4124-010	5975-00-201-3525	EA	
METER PANEL ASSEMBLY, CONSISTING OF:			
METER PANEL, E/W 75-VOLT DC VOLTMETER	NSNR	EA	
AMMETER, 150-A, LORAIN 2925-774	NSNR	EA	
AMMETER SHUNT, 150-A, LORAIN 2982-713	NSNR	EA	
KIT, EMERGENCY BATTERY SAFETY	NSNR	EA	
INVERTER, 500-VA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MAA501B	NSNR	EA	
INVERTER, 1-KVA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MAA102B	NSNR	EA	
INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1Ø, 50/60 HZ, LORAIN RMB202B1	NSNR	EA	
INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MAA202B	NSNR	EA	
FUSE PANEL, TWENTY-TWO 0-5A POSITIONS, LORAIN 4318-405	NSNR	EA	
FUSE PANEL, EIGHT 0-30A FUSE POSITIONS, LORAIN 4317-00B	5920-00-878-4817	EA	
FUSE PANEL, FOUR 0-30A & FOUR 31-60A FUSE POSITIONS, LORAIN 4317-010	NSNR	EA	
FUSE PANEL, EIGHT 31-60A FUSE POSITIONS, LORAIN 4317-009	NSNR	EA	
FUSE PANEL, TWO 61-400A POSITIONS, LORAIN 4316-002	5920-00-878-4805	EA	
FUSE PANEL, FOUR 61-400A FUSE POSITIONS, LORAIN 4317-012	5920-00-156-3681	EA	
FILTER, DECENTRALIZING, 50A, LORAIN 4826-065	NSNR	EA	
ELECTROLYTE, 15-GAL CONTAINER, 1,400 S.G.	NSNR	EA	
ELECTROLYTE, 5-GAL CONTAINER, 1,400 S.G.	NSNR	EA	
DISCONNECT PANEL, LOW-VOLTAGE, 23" X 3-1/2", 100-A, LORAIN 4863-718	6130-00-177-3097	EA	
CIRCUIT BREAKER ENCL, E/W TWO 50-A MAIN, TWO 15-A, TWO 10-A, AND TWENTY 5-A DC BREAKERS, CURTIS 271CB	NSNR	EA	
CEMF CELL PANEL, 3-V, 160-A, 23" X 8-3/4", LORAIN 4827-302	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONE 4 RESTRAINTS, EXIDE 83987-84	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84020-84	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84556-84	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, EXIDE 81729-96	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS (2) 77406, EXIDE 80451-84	NSNR	EA	
BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074516-666	NSNR	EA	

LIST OF MATERIALS

41	24943F	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074516-333	NSNR	EA
40	24983B	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3 AND 4 RESTRAINTS, GOULD 507-078190-666	NSNR	EA
39	24982A	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-078190-333	NSNR	EA
38	24496J	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-9-EPII	NSNR	EA
37	24495K	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-9-EPI	NSNR	EA
36	24981Z	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-3-EPII	NSNR	EA
35	24980Z	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-3-EPI	NSNR	EA
34	24935W	BATTERY RACK, 2-STEP, EXIDE 84556-84	NSNR	EA
33	24979W	BATTERY RACK, 2-STEP, EXIDE 80451-84	NSNR	EA
32	10932F	BATTERY RACK, 2-STEP, GOULD 507-074516	NSNR	EA
31	24978H	BATTERY RACK, 2-STEP, GOULD 507-078190	NSNR	EA
30	24866F	BATTERY RACK, 2-STEP, C & D RD-903-9	NSNR	EA
29	24977G	BATTERY RACK, 2-STEP, C & D RD-903-3	NSNR	EA
28	24925Z	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84753-84	NSNR	EA
27	24924W	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84786-84	NSNR	EA
26	24923L	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84539-84	NSNR	EA
25	24976F	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, EXIDE 84135-84	NSNR	EA
24	24975E	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS (2) 77406, EXIDE 80438-84	NSNR	EA
23	24918D	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074478-666	NSNR	EA
22	24917C	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074478-333	NSNR	EA
21	24974D	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-078190-666	NSNR	EA
20	24973C	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-078150-333	NSNR	EA
19	24481N	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-9-EPII	NSNR	EA
18	24480Y	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-9-EPI	NSNR	EA
17	24972B	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-3-EPII	NSNR	EA
16	24971A	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-3-EPI	NSNR	EA
15	24909F	BATTERY RACK, 2-TIER, EXIDE 84539-84	NSNR	EA
14	24970Z	BATTERY RACK, 2-TIER, EXIDE 80438-84	NSNR	EA
13	24844F	BATTERY RACK, 2-TIER, GOULD 507-074478	NSNR	EA
12	24969Z	BATTERY RACK, 2-TIER, GOULD 507-078150	NSNR	EA
11	18132P	BATTERY RACK, 2-TIER, C & D RD-901-9	NSNR	EA
10	24968W	BATTERY RACK, 2-TIER, C & D RD-901-3	NSNR	EA
9	24967H	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1020 AH, EXIDE 26C-11	NSNR	EA
8	24966G	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1050 AH, GOULD NCX-1050	NSNR	EA
7	24965F	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1008 AH, C & D LCT-1008	NSNR	EA
6	24896C	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 860 AH, EXIDE 26C-9	NSNR	EA
5	24964E	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 672 AH, GOULD NCX-672	NSNR	EA
4	24894A	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 840 AH, C & D LCT-840	NSNR	EA
3	24963D	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 360 AH, EXIDE EU-7	NSNR	EA
2	24962C	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 380 AH, GOULD NCX-380	NSNR	EA
1	24961B	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 433 AH, C & D ALCY-7	NSNR	EA

ITEM		SML	DESCRIPTION	NSN	UI	QTY
<div> <div> DENT NO STD-MS-0019 SHEET 1 OF 18 </div> <div> ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY </div> </div>						
<div> <div> DESIGN BY S FENSEL DATE APR 79 </div> <div> DRAWN BY S D H DATE APR 79 </div> </div>						
<div> <div> CHECKED BY F MYERS DATE APR 79 </div> <div> 48V DC, 100 A CEMF CELL BATTERY FACILITY </div> </div>						
APPROVAL		ACTIVITY	SIZE	PSCH NO	DRAWING NO	
		CCC-CED-SEP	D	50470		
PROJECT		SCALE	NONE	SHEET OF		

4

3

2

1

D

C

B

A

DRAWING NO. 21 10467

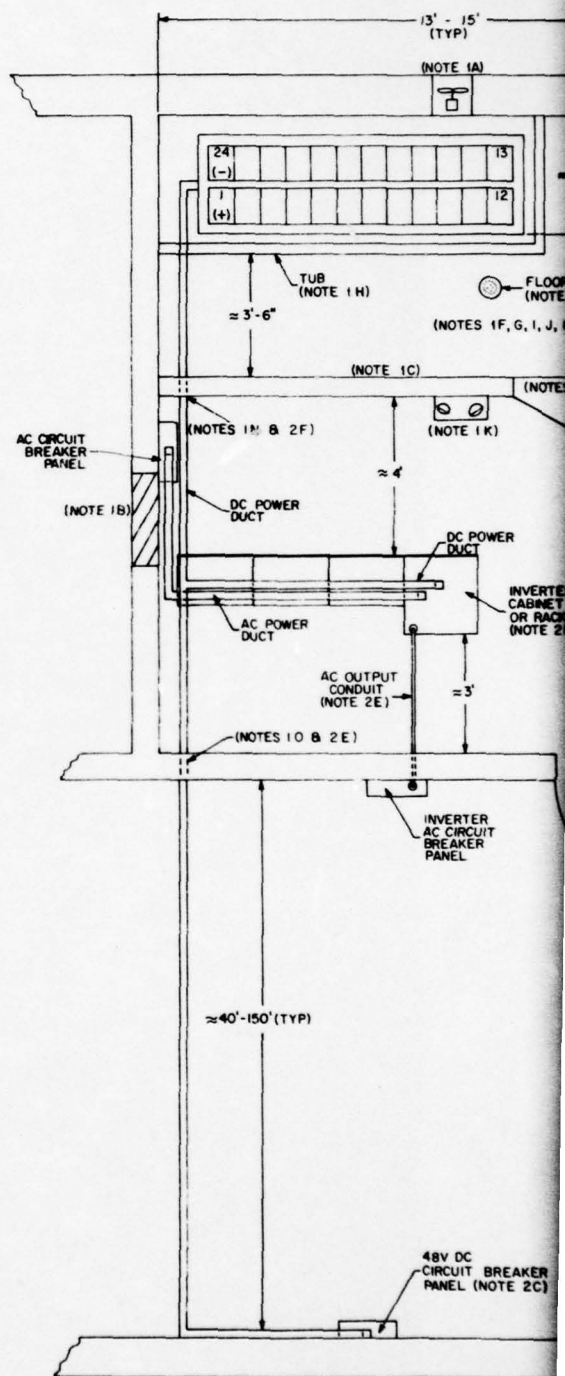
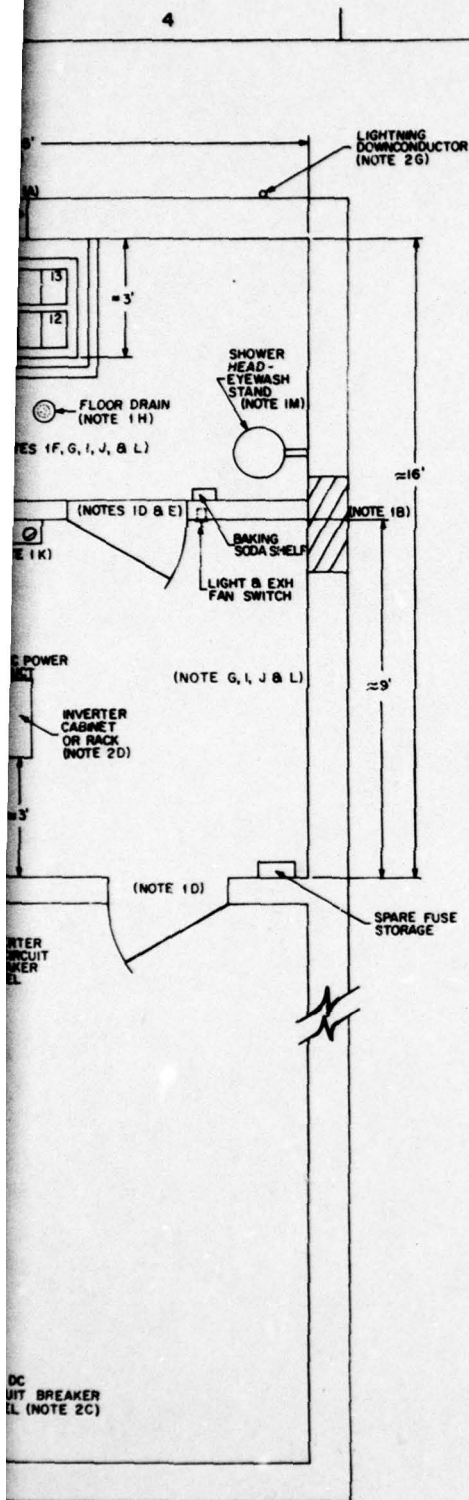


FIGURE 1
TYPICAL 48 V DC BAT
FACILITY LAYO
(NOTE 2A)



REVISION			
ZONE	REV	DESCRIPTION	DATE

1. FACILITY ENGINEER NOTES:

- PROVIDE AND INSTALL A 400- TO 800-CFM, ELECTRIC, SPARK-PROOF EXHAUST FAN IN THE BATTERY ROOM WITH ON/OFF SWITCH LOCATED OUTSIDE NEAR THE BATTERY ROOM ENTRANCE DOOR.
- WALL IN UNNECESSARY DOOR, WINDOW, OR OTHER OPENINGS WITH MASONRY.
- ERECT A PERMANENT PARTITION OR WALL FROM FLOOR TO CEILING.
- PROVIDE AND INSTALL AN ENTRANCE DOOR ≈ 3'-3" WIDE AND 6'-3" HIGH WITH LOCKING DEVICE ON THE DC EQUIPMENT ROOM DOOR.
- PROVIDE A 1" OR HIGHER DOOR SILL TO CONTAIN LIQUIDS WITHIN THE BATTERY ROOM.
- REMOVE ANY EXISTING NORMAL LIGHTING FIXTURES, SWITCHES, ELECTRICAL OUTLETS, AND UNUSED ELECTRICAL WIRING IN THE PROPOSED BATTERY ROOM.
- REMOVE ANY UNNECESSARY HEATERS AND PLUMBING.
- IF A FLOOR DRAIN IS USED IN THE BATTERY ROOM, PROVIDE A LEVEL AREA (±1/8") FOR THE BATTERY BANK. SLOPE THE REMAINING FLOOR AREA TO THE DRAIN. THE DRAIN SHOULD BE ROUTED TO AN ACID CATCH BASIN WHERE ACID CAN BE NEUTRALIZED AND DRAINED OR PUMPED INTO THE SEWER NETWORK IN CASE OF LARGE SPILLS. IF A DRAIN CANNOT BE USED, AN ACID-PROOF TUB (CONCRETE OR OTHER) MUST BE PROVIDED UNDER THE BATTERY RACK TO CONTAIN POTENTIAL SPILLS. (SEE SHEET 4, TABLE 3, FOR BATTERY RACK DIMENSIONS.)
- PATCH ANY HOLES AND PAINT THE TUB, WALLS (TO A HEIGHT OF 5'), AND FLOOR WITH AN ACID-RESISTANT COATING. PAINT THE REMAINING WALL AND CEILING TO MATCH THE OTHER AREAS. PATCH AND PAINT THE DC EQUIPMENT ROOM TO MATCH.
- PROVIDE AND INSTALL SPARK-PROOF LIGHTING FIXTURES IN THE BATTERY ROOM WITH THE ON/OFF SWITCH LOCATED OUTSIDE THE BATTERY ROOM DOOR. MINIMUM ILLUMINATION SHOULD BE 30 FOOT-CANDLES 3 FEET ABOVE THE FLOOR. PROVIDE AND INSTALL FLUORESCENT LIGHT FIXTURES IN THE DC EQUIPMENT ROOM. REQUIRED ILLUMINATION IS ≈ 50 FOOT-CANDLES 3 FEET ABOVE THE FLOOR.
- PROVIDE AND INSTALL AUTOMATIC EMERGENCY LIGHTING TO ILLUMINATE THE DC EQUIPMENT RACK FRONTS AND DOOR DURING AC POWER FAILURES.
- PROVIDE LONG-TERM ENVIRONMENTAL CONTROL TO KEEP THE BATTERY AND DC EQUIPMENT ROOMS BETWEEN 60°F (15.6°C) AND 85°F (29.4°C) AND A RELATIVE HUMIDITY RANGE OF 20 TO 60 PERCENT. OCCASIONAL TEMPERATURE AND HUMIDITY VARIATIONS ABOVE AND BELOW THE ABOVE LIMITS ARE PERMISSIBLE.
- PROVIDE AND INSTALL A COLD WATER DELUGE SHOWER HEAD AND EYEWASH STAND.
- PROVIDE AN OPENING FOR THE DC POWER DUCT BETWEEN THE DC EQUIPMENT AND BATTERY ROOMS.
- PROVIDE OPENINGS IN THE CEILING/WALL FOR THE AC AND DC POWER DUCTS BETWEEN THE DC POWER AND COMMUNICATIONS EQUIPMENT.

2. COMMUNICATIONS ENGINEER NOTES:

- THIS LAYOUT IS TYPICAL FOR A BATTERY FACILITY LOCATION ON THE SAME FLOOR WITH THE COMMUNICATIONS EQUIPMENT.
- FOR RELATIVELY SHORT DISTANCES TO THE COMMUNICATIONS EQUIPMENT (≤ 75'), LOCAL DISTRIBUTION IN THE DC EQUIPMENT ROOM CAN BE USED; SEE SHEET 3 AND 12.
- FOR LONGER DISTANCES OR SEPARATE LOCATIONS AND MODERATE DISTRIBUTION REQUIREMENTS, THE WALL-MOUNTED CIRCUIT BREAKER ARRANGEMENT IS RECOMMENDED, ESPECIALLY IF FLOOR SPACE IS MINIMUM; SEE SHEETS 6 AND 13. SEVERAL PANELS CAN BE USED, LOCATED NEAR THE LOADS.
- AN INVERTER FROM 0.5 TO 2 KVA CAN BE INSTALLED TO PROVIDE 120-V AC, 1ø, 50/60 HZ POWER FOR CRITICAL AC-POWERED EQUIPMENT.
- THE DUCTS BETWEEN THE BATTERY FACILITY AND COMMUNICATIONS EQUIPMENT SHOULD CONTAIN AN INSULATING COUPLING NEAR THE PENETRATIONS IN THE DC EQUIPMENT ROOM TO PREVENT ELECTRICAL NOISE FROM THE DC POWER RACKS FROM BEING CONDUCTED TO THE COMMUNICATIONS EQUIPMENT ALONG THE METAL DUCTS.
- AFTER ALL CABLES ARE INSTALLED, SEAL THE INSIDE OF THE DC DUCT AT THE PENETRATION BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS WITH NONHARDENING SEALER TO PREVENT CONDUCTION OF GASES TO THE DC EQUIPMENT RACKS.
- GROUND THE BATTERY RACK ONLY IF LOCATED WITHIN 6 FEET OF A LIGHTNING DOWN-CONDUCTOR.

FIGURE 1
VDC BATTERY
FACILITY LAYOUT
(SEE SHEET 2A)

DRAWING NO.		SHEET 2 OF 18	
D 50470		DRAWN BY L. H. LEE	
SCALE NONE		APPROVED <i>H. J. Selva</i>	
SHEET OF		2	

D

C

B

A

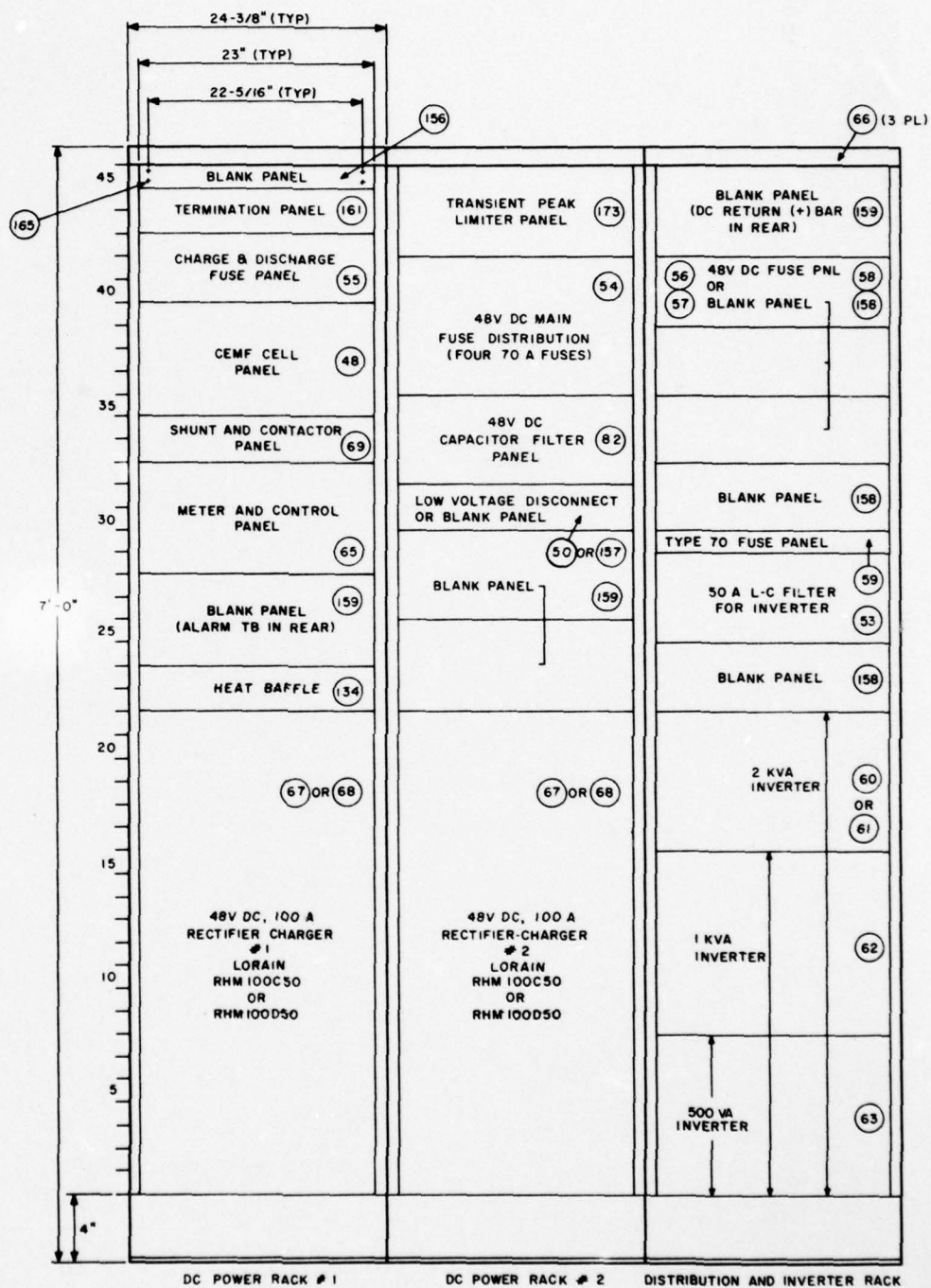


FIGURE 2
DC POWER EQUIPMENT RACK FACE LAYOUT
 (NOTE 301)

LORAIN NUMBER
INPUT VOLTS
NO. LOADS
FULL LOAD AMPS
OUTPUT VOLTS
FREQUENCY
EFFICIENCY PERCENT
HEIGHT IN
WIDTH IN
DEPTH IN
WEIGHT LB
MOUNTING

REVISION			
ZONE	REV	DESCRIPTION	DATE

1. GENERAL ENGINEER NOTES:

- A. THE RACK LINEUP SHOULD BE OPTIMIZED FOR THE PARTICULAR APPLICATION. RACKS SHOULD BE EASILY ACCESSIBLE FOR MAINTENANCE. RACKS SHOULD ALSO BE PLACED FOR MINIMUM AVERAGE CABLE LENGTHS TO ALL CONNECTED EQUIPMENT.
- B. SPACE IS REQUIRED IN RACK OF ALL EQUIPMENT RACKS. MINIMUM CLEARANCE IS 24 INCHES. DESIRABLE DISTANCE IS 36 INCHES OR GREATER.
- C. ONE SIDE OF THE EQUIPMENT LINEUP CAN BE PLACED AGAINST A WALL OR OTHER EQUIPMENT. IF PLACED AGAINST A WALL, ALLOW A MINIMUM OF 4 INCHES OF CLEARANCE.

2. GENERAL INSTALLER NOTES:

- A. RECTIFIER-CHARGER AND CONTROL RACK INSTALLATION STEPS.
 - (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
 - (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
 - (3) DETERMINE FLOOR POSITION AND BOLT THE RECTIFIER-CHARGER AND CONTROL RACKS TO THE FLOOR.
 - (4) BOLT THE RACKS TOGETHER NEAR THE TOP.
 - (5) INSTALL THE RECTIFIER-CHARGERS IN RACKS 1 AND 2.
 - (6) ASSEMBLE THE DISTRIBUTION RACK.
 - (7) INSTALL THE AC AND DC POWER DUCTS OVER THE RACKS AND INTO THE BATTERY ROOM.
 - (8) INSTALL DC POWER CABLES UP TO THE BATTERY TERMINALS, BUT DO NOT CONNECT TO THE BATTERY AT THIS TIME. (TAPE THE ENDS OF THE CABLES TO PREVENT ACCIDENTAL CONTACT.)
 - (9) INSTALL AC AND REMAINING DC POWER CABLES.
 - (10) COMPLETE WIRING OF THE RECTIFIER-CHARGER AND CONTROL RACKS.
 - (11) AFTER ALL CABLES ARE INSTALLED, PROVIDE A BARRIER INSIDE THE DUCT WHERE IT CROSSES BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS.
- B. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH SECTION 7 OF THIS SET.

NOTES:

301. SELECT THE APPROPRIATE FUSE PANELS FOR LOCAL DISTRIBUTION. SEE SHEET 12. COVER UNUSED RACK SPACE WITH BLANK PANELS. REFER TO SHEETS 6 AND 13 FOR THE WALL-MOUNTED CIRCUIT BREAKER PANEL DISTRIBUTION.
302. SUITABLE ALTERNATE INVERTERS ARE LAMARCHE A51-500-48V (500 VA), A51-1K-48V (1 KVA), AND A51-2K-48V (2 KVA).

TABLE 1
LORAIN INVERTER CHARACTERISTICS (NOTE 302)

	500 VA	1 KVA	2 KVA	2 KVA
MODEL	MAA501B	MAA102B	MAA202B	XMBG2C2B1
VOLTAGE, DC	42-56	42-56	42-56	42-56
NO. CURRENT, DC	3.1	6.1	11.5	10.2
LOAD CURRENT, DC	13.6	26.2	51.0	52.0
RT. VOLTAGE, AC	120	120	120	120
ENCY.	60	60	60	50/60
CIENCY, ENT	70	70	75	75
NT.	12-7/32	26-1/4	37-3/16	37-3/16
N.	19	23	23	20-13/16
N.	13	15	15	15
NT.	115	220	350	335
TYING	RACK	RACK	RACK	FLOOR

STANDARD STD-MS-0019	SHEET FROM NO. D 50470	DRAWING NO.
DRAWN BY S.D.H.	SCALE NONE	SHEET OF
APPROVED <i>[Signature]</i>		

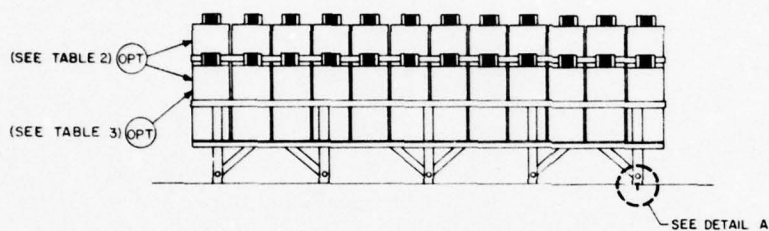
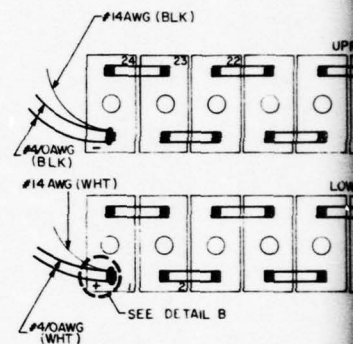


FIGURE 3
TYPICAL BATTERY & RACK INSTALLATION



TYPICAL BATTERY

TABLE 2
BATTERY CAPACITY AND CELL TYPE

REQUIRED FULL LOAD BATTERY POWER, HOURS	REQUIRED AMPERE- HOURS	CELL TYPE (NOTE 10)		
		C&D	GOULD	EXIDE
1	100 # 1-HR RATE	4LCY-7	MCX-380	EU-7
4	400 # 4-HR RATE	LCT-840	NCX-672	2GC-9
8	800 # 8-HR RATE	LCT 1008	NCX-1050	2GC-11

TABLE 3
BATTERY BANK DATA

MAKE	BATTERY CELL	TWO-STEP RACK							TWO-TIER RACK							CONTAINERS OF ELECTROLYTE		DIFFUSER VENT NO.
		BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS			BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS					
			1	2	3&4	L	W	H		1	2	3&4	L	W	H	15 GAL	5 GAL	
C&D	4LCY-7	RD-903-3	-EPI	-EPI	-EPII	3'	30"	29.69"	RD-901-3	-EPI	-EPI	-EPII	3'	20.31"	42.69"	3	0	PV-374
	LCT-840	RD-903-9	-EPI	-EPI	-EPII	9'	30"	29.69"	RD-901-9	-EPI	-EPI	-EPII	9'	20.31"	42.69"	10	2	PV-223
	LCT-1008	RD-903-9	-EPI	-EPI	-EPII	9'	30"	29.69"	RD-901-9	-EPI	-EPI	-EPII	9'	20.31"	42.69"	10	1	PV-223
GOULD	MCX-380	507-078190	-333	-666	-666	6'	24.75"	21.75"	507-078150	-333	-666	-666	6'	15.75"	35.25"	3	2	N03-104881
	NCX-672	507-074516	-333	-666	-666	8'	30.75"	23.75"	507-074478	-333	-666	-666	8'	19.75"	41.25"	9	2	N03-104881
	NCX-1050	507-074516	-333	-666	-666	8'	30.75"	23.75"	507-074478	-333	-666	-666	8'	19.75"	41.25"	8	-	N03-104881
EXIDE	EU-7	80451-84	1	2&3	4	7'	23.75"	14"	80438-84	1	2&3	4	7'	17"	33"	4	2	71654
	2GC-9	84556-84	84556-84	84020-84	83987-84	7'	42"	22.81"	84539-84	84539-84	84786-84	84753-84	7'	22"	54.69"	11	-	83440
	2GC-11	84556-84	84556-84	84020-84	83987-84	7'	42"	22.81"	84539-84	84539-A	84786-84	84753-84	7'	22"	54.69"	10	1	83440

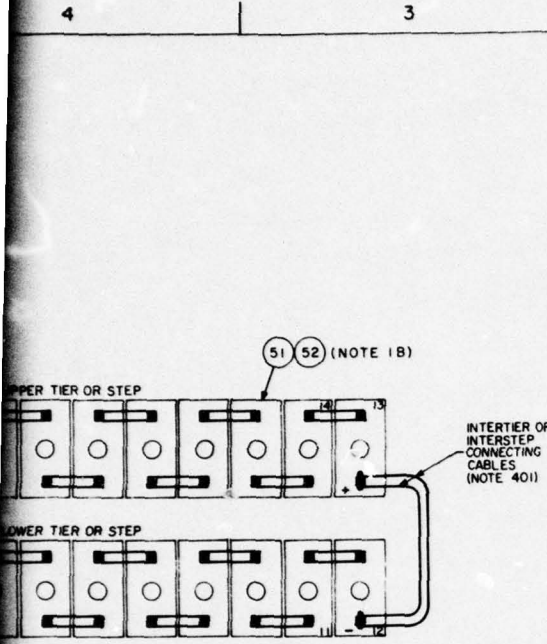
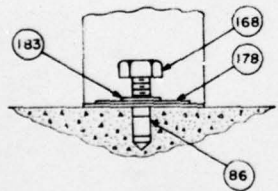
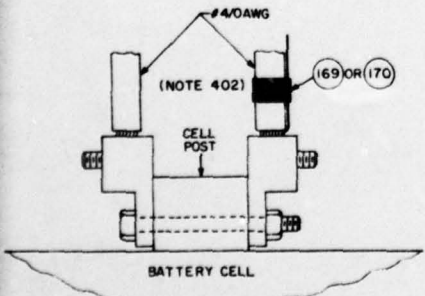


FIGURE 4
BATTERY INTERCONNECTION DIAGRAM



DETAIL A

BATTERY RACK TO CONCRETE FLOOR MOUNTING



DETAIL B

BATTERY POST CONNECTOR INSTALLATION

REVISION			
ZONE	REV	DESCRIPTION	DATE

1. GENERAL ENGINEER NOTES:

- A. TWO-STEP BATTERY RACK PERMITS EASIER MAINTENANCE BUT REQUIRES GREATER DEPTH. WHERE THE BATTERY ROOM IS NARROW, A TWO-TIER RACK MAY BE PREFERRED. SEE TABLE 3 FOR BATTERY RACK DIMENSIONS. REFER TO DRAWING STD-MS-0025 TO DETERMINE SHOCK PROTECTION REQUIREMENTS FOR BATTERY RACKS. ADD SUFFIXES SHOWN IN THE SEISMIC ZONE COLUMNS TO THE BASIC RACK NUMBER FOR C & D AND GOLD RACKS. ORDER RACK NUMBERS SHOWN IN SEISMIC ZONE COLUMN FOR EXIDE RACKS. (NOTE THAT EXIDE BATTERY RACKS FOR ZONES 2 & 3 ARE IN COLUMN 2. ZONE 4 RACKS ARE IN COLUMN 3.)
- B. FOR CONUS INSTALLATION, CELLS SHOULD BE SHIPPED WET, FILLED WITH THE PROPER ELECTROLYTE FROM THE MANUFACTURER'S PLANT. FOR OVERSEAS SHIPMENT, CELLS SHOULD BE SHIPPED DRY-CHARGED, TO BE FILLED WITH ELECTROLYTE AFTER INSTALLATION.
- C. ALL CELLS SHOULD BE EQUIPPED WITH DIFFUSER VENTS. ORDER THEM SEPARATELY IF NOT FURNISHED AS PART OF EACH CELL. SEE TABLE 3.
- D. BASED ON A MINIMUM BATTERY TERMINAL VOLTAGE OF 45.5 V (44.0 MIN FOR EQUIP AND 1.5 TOTAL LINE DROP).
- E. ORDER THE FOUR LEAD-PLATED COPPER TERMINAL LUGS AS PART OF THE BATTERY PACKAGE.
- F. BATTERY RACK DIMENSIONS ARE WITHOUT SEISMIC BRACING. ALLOW APPROXIMATELY 2" ADDITIONAL WIDTH FOR TWO-TIER AND 10" ADDITIONAL WIDTH FOR TWO-STEP RACKS WITH SEISMIC BRACING. (NOTE THAT THE LENGTH OF SOME EXIDE RACKS IS INCREASED FOR SEISMIC ZONES 2, 3, AND 4. THE RACK LENGTH IS PROVIDED IN INCHES FOLLOWING THE PART NUMBER AND DASH.)

2. GENERAL INSTALLER NOTES:

A. BATTERY BANK INSTALLATION STEPS:

- (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
- (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
- (3) ASSEMBLE THE BATTERY RACK AND ANCHOR TO THE FLOOR. THE FLOOR SPACE FOR THE BATTERY BANK SHOULD BE LEVEL. IF THIS IS NOT THE CASE, USE STEEL FLAT WASHERS UNDER THE BATTERY RACK LEGS TO LEVEL THE BATTERY RACK PRIOR TO INSTALLING THE CELLS.
- (4) BEFORE PROCEEDING WITH THE UNPACKING, HANDLING, INSTALLATION, AND OPERATION OF THE LEAD-ACID CELLS, REVIEW THE SAFETY PRECAUTIONS LISTED IN THE MANUFACTURER'S MANUAL.
- (5) EXAMINE ALL CELLS FOR CONCEALED DAMAGE.
- (6) PLACE CELLS ON BATTERY RACK AND INSTALL CELL TERMINAL HARDWARE.
- (7) ELECTROLYTE IS SHIPPED IN CONCENTRATED FORM AND MUST BE DILUTED WITH DISTILLED WATER PRIOR TO USE IN THE CELLS. USE OF CONCENTRATED (HIGH SPECIFIC GRAVITY) ACID WILL DAMAGE THE CELL. INITIAL FILLING OF CELLS SHALL BE DONE WITH ELECTROLYTE HAVING A SPECIFIC GRAVITY BETWEEN 1.203 AND 1.206.
- (8) PRIOR TO REMOVING BATTERY CAPS, PREPARE ENOUGH ELECTROLYTE TO FILL SEVERAL CELLS. SINCE ADDITION OF CONCENTRATED SULFURIC ACID TO WATER GENERATES HEAT, THE ELECTROLYTE MUST BE PREPARED IN ADVANCE TO ALLOW TIME FOR COOLING. THE ELECTROLYTE SHOULD NOT BE HOTTER THAN 90°F WHEN POURED INTO THE CELLS.

CAUTION: ALWAYS POUR ACID INTO WATER--NEVER WATER INTO ACID. POUR ACID SLOWLY, SINCE FAST POURING WILL GENERATE ENOUGH HEAT TO INDUCE VIOLENT BOILING. WEAR RUBBER GLOVES, RUBBER APRON, AND GOGGLES WHILE PREPARING ELECTROLYTE AND FILLING CELLS.
- (9) AFTER UNPACKING THE DIFFUSER VENT CAPS AND PREPARING CELLS FOR RECEIPT OF ELECTROLYTE, FILL THE CELLS WITH ELECTROLYTE TO THE MIDDLE LEVEL MARKED ON THE PLASTIC JARS. (THIS WILL ALLOW SOME SPACE FOR SLIGHT ADJUSTMENTS IN SPECIFIC GRAVITY LATER.)
- (10) CHECK THE SPECIFIC GRAVITY AT ROOM TEMPERATURE AND ADJUST TO 1.205 IF NECESSARY.

B. INSTALLERS MUST TAKE SPECIAL CARE NOT TO CUT OR ABRASE THE DC CABLE INSULATION DURING INSTALLATION IN THE DUCTS BETWEEN THE BATTERY BANK AND DC EQUIPMENT RACKS.

NOTES:

401. THE INTERCONNECTING CABLES AND INTERCELL STRAPS ARE PART OF THE BATTERY INTERCONNECTION KIT.
402. TO PREVENT DAMAGE TO THE BATTERY CELL POSTS, INSTALL THE 4/0 AWG CABLES SO THAT THEIR WEIGHT WILL BE SUPPORTED BY THE CABLE DUCT OR LADDER. IN ADDITION, FORM THE CABLES SO THAT THERE IS NO SIGNIFICANT STRESS IN ANY DIRECTION ON THE POSTS.

IDENT. NO. STD-MS-0019		SIZE PSCW NO. D 50470	DRAWING NO.
SHEET 4 OF 18			
DRAWN BY L. H. LEE		SCALE NONE	SHEET OF
APPROVED <i>[Signature]</i>			

AD-A072 142

ARMY COMMUNICATIONS COMMAND FORT HUACHUCA AZ
STANDARD ENGINEERING INSTALLATION PACKAGE. UNINTERRUPTIBLE POWE--ETC(U)
JUL 79

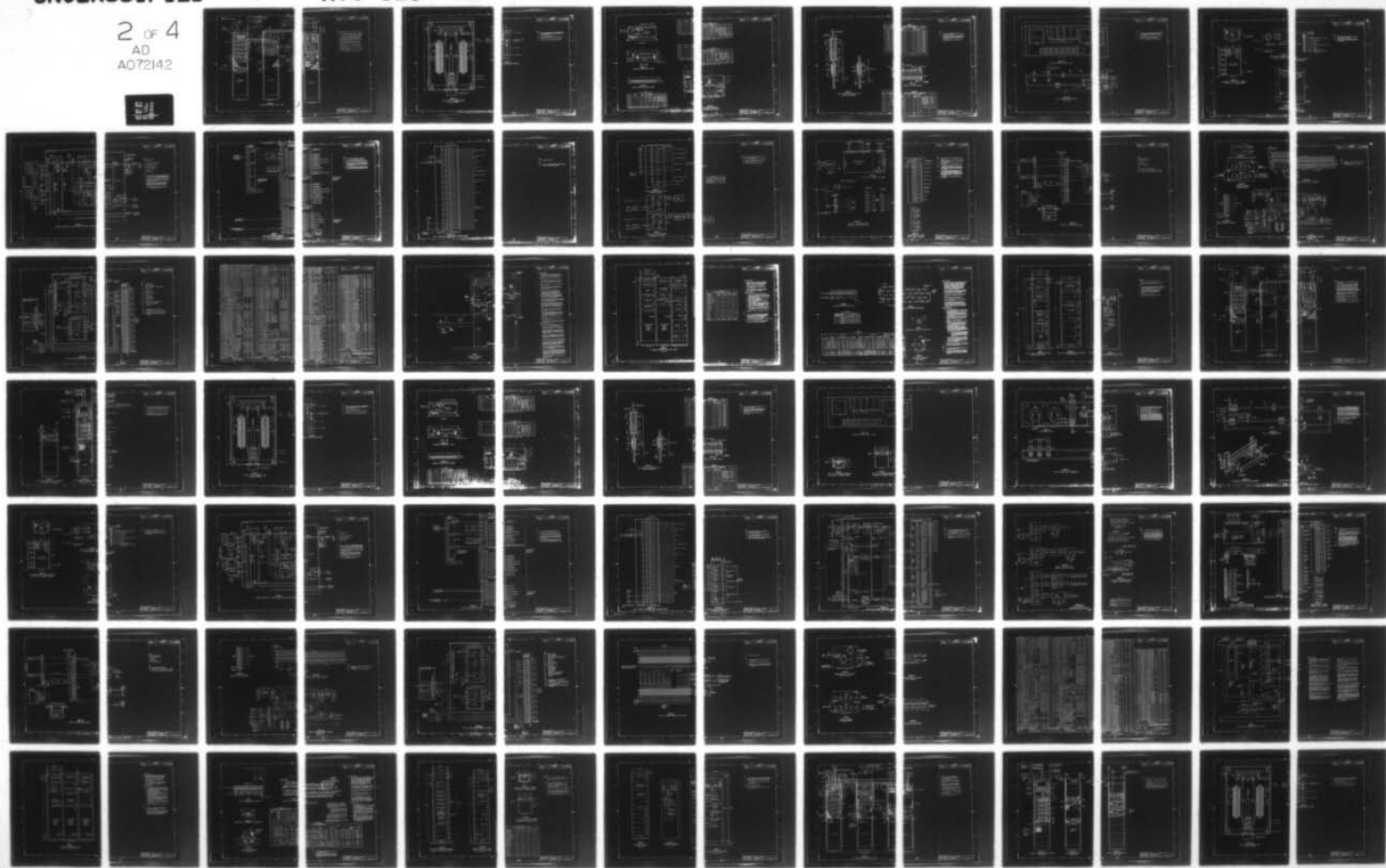
F/G 9/3

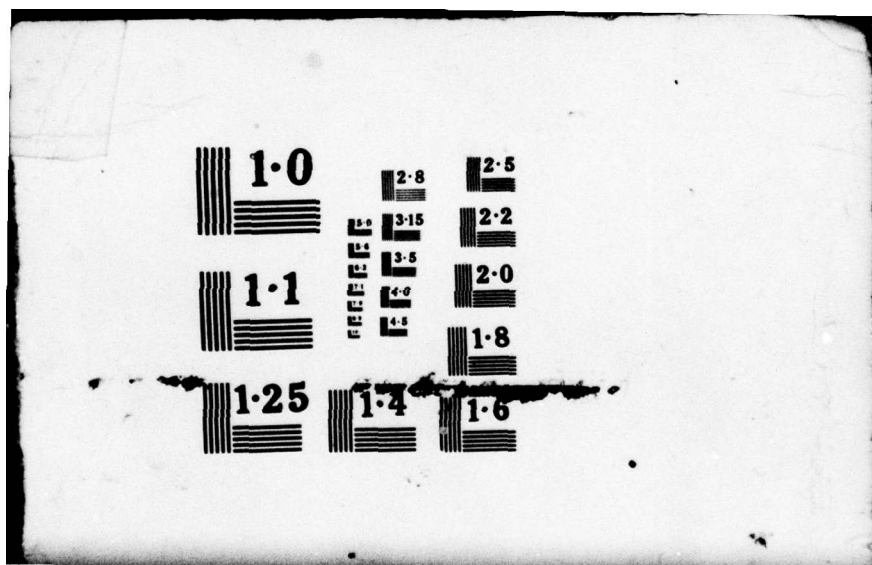
UNCLASSIFIED

ACC-SEIP-020

NL

2 OF 4
AD
A072142





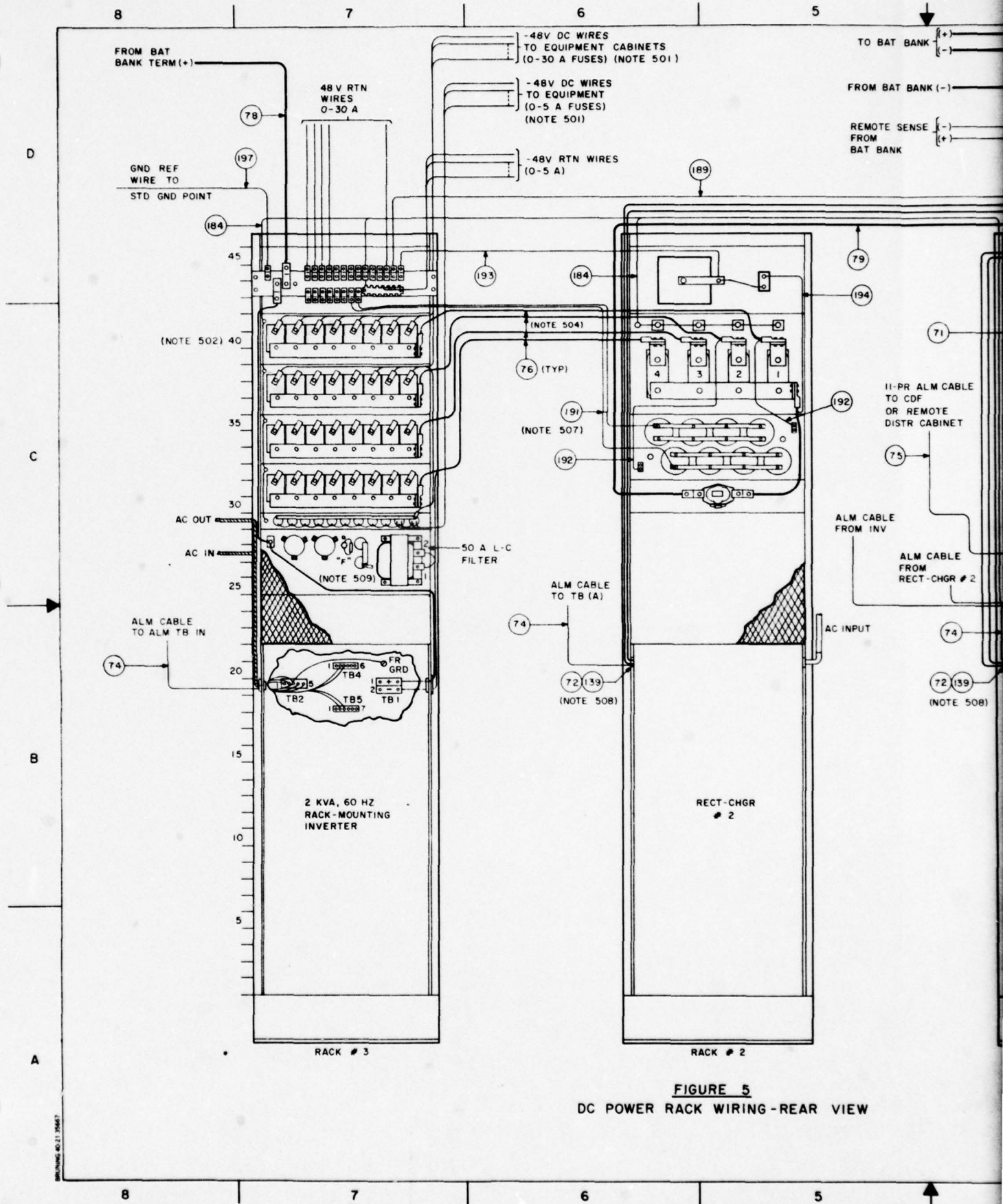
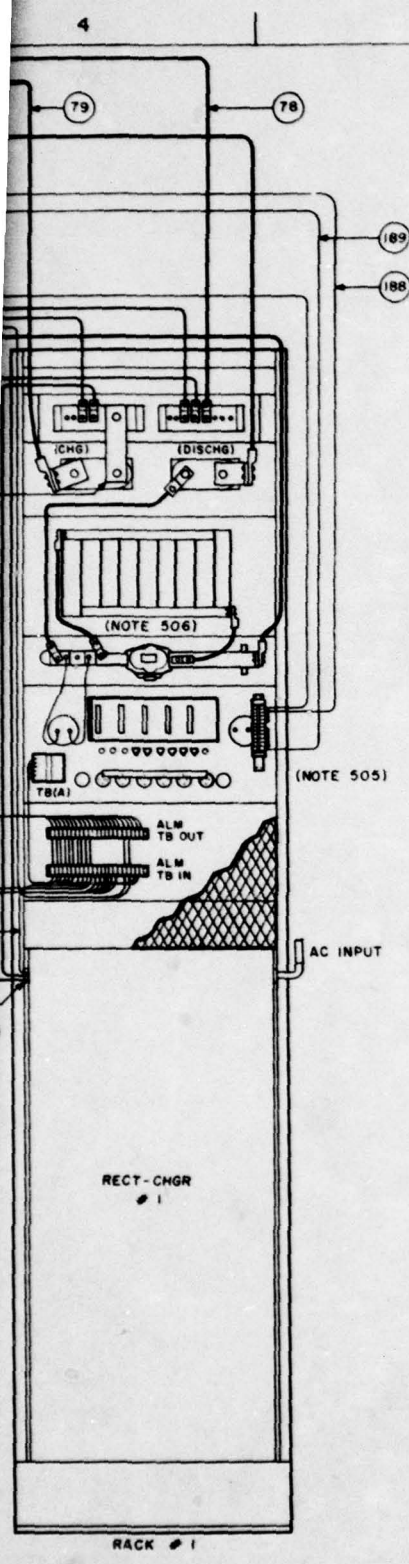


FIGURE 5
DC POWER RACK WIRING-REAR VIEW



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

- NOTES:
501. LOAD DISTRIBUTION WIRE SIZES MUST BE CHOSEN BY LOAD CURRENT AND LOOP DISTANCE.
 502. FUSE PANELS ARE INSTALLED AND WIRED WHEN LOCAL DISTRIBUTION IS USED. INSTALL AND WIRE PANELS TO MEET SITE REQUIREMENT.
 503. OBSERVE MINIMUM BENDING RADIUS FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.
 504. INSTALL NUMBER AND SIZE OF CABLES TO DISTRIBUTION PANELS IN RACK #3, OR WALL MOUNTED DISTRIBUTION PANEL TO LIMIT VOLTAGE DROP TO ACCEPTABLE LEVEL.
 505. THE METER AND CONTROL PANEL IS SUPPLIED AND WIRED BY THE MANUFACTURER. ADDITIONAL INSTALLER WIRING IS SHOWN IN FIGURE 21, SHEET 18.
 506. FORM THE CABLE TO RELIEVE THE STRESS ON THE METER SHUNT.
 507. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
 508. PUNCH OUT THE 2-INCH KNOCKOUT IN THE COVER PLATE AND INSTALL THE BUSHING WITH LOCKNUT.
 509. FOR 48V OPERATION REMOVE THE JUMPER WIRE ACROSS RESISTOR "F".

IDENT. NO. STD-MS-0019		SIZE	FSCH NO.	DRAWING NO.
SHEET 5 OF 16		D	50470	
DRAWN BY S.D.H.		SCALE	NONE	
APPROVED <i>H.P.L. [signature]</i>		SHEET 5 OF 16		

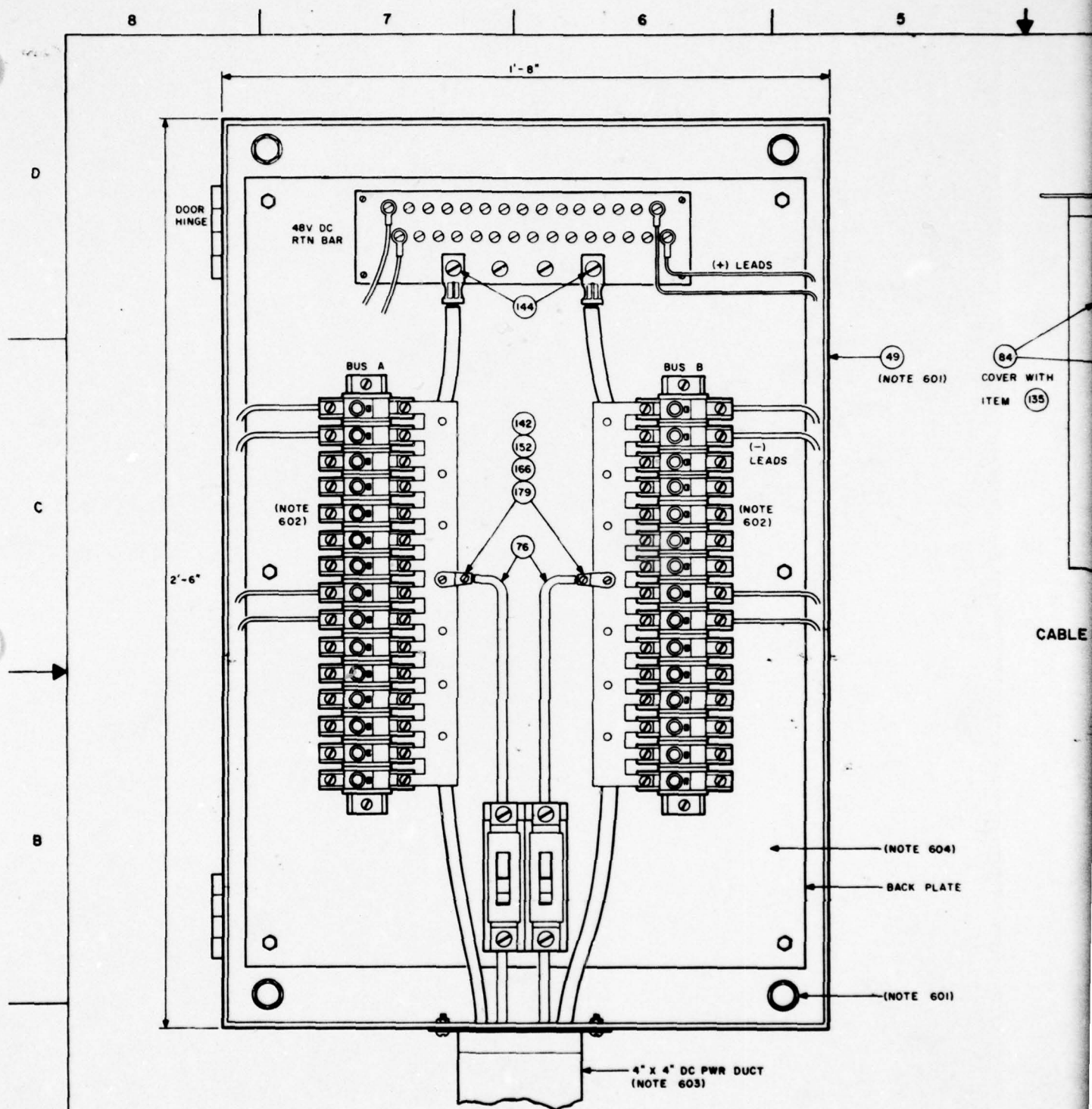
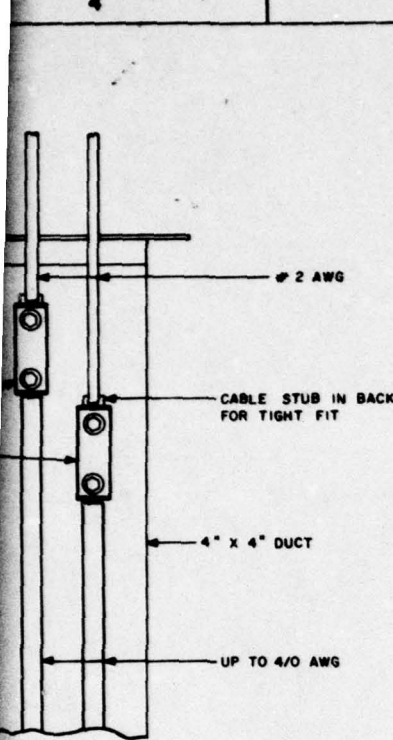


FIGURE 6

**48V DC CIRCUIT BREAKER PANEL
LAYOUT & WIRING**



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

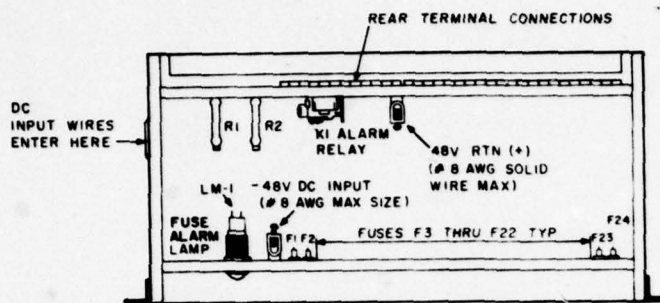
- NOTES:
- 601. MOUNT THE CIRCUIT BREAKER PANEL ON WALL OF THE COMMUNICATIONS ROOM, NEAR THE EQUIPMENT SERVED. MOUNTING HARDWARE TO BE SPECIFIED IN SITE EIP.
 - 602. SPECIFY THE REQUIRED BREAKER SIZES.
 - 603. THE DC POWER DUCT NETWORK INSTALLATION DETAILS ARE PART OF EACH EIP.
 - 604. THE CB PANEL IS SHOWN WITH OPEN DOOR AND COVER REMOVED.

DETAIL C

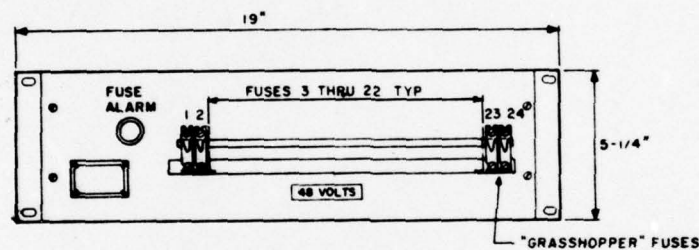
E SIZE REDUCING METHOD

STD-MS-0019		SHEET 8 OF 18	
DESIGN BY	S.D.H.	DATE	50470
APPROVED	<i>[Signature]</i>	SCALE	NONE

2



TOP VIEW



FRONT VIEW

FIGURE 7
SB-1523/FT FUSE PANEL LAYOUT

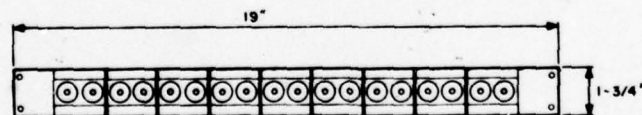


FIGURE 8
LORAIN TYPE 70 O-5A FUSE PANEL

TABLE 4
TYPE 70 FUSE DISTRIBUTION DATA TABLE

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN OR MFR'S NO.	TYPE
1			1-1/3	18 TO 14	WHITE	5920-00-539-6347	70
2			2	18 TO 12	ORANGE	5920-00-284-9217	70
3			3	14 TO 10	BLUE	5920-00-284-9218	70
4			5	14 TO 8	GREEN	5920-00-638-6205	70
5							
6							
7							

* SELECT THE WIRE SIZE BASED ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF ≤ 0.30 -V DC.

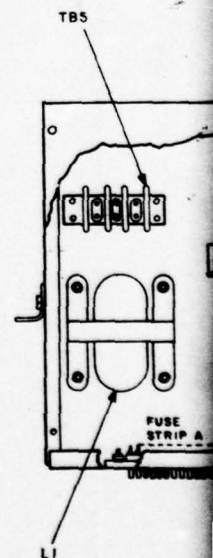
"GRASSHOPPER"

FUSE	EQUIPMENT	APPROX LOAD ADC
1		
2		
3		
4		
5		
6		
7		

* SELECT THE WIRE SIZE BASED ON A MAXIMUM

FUSE	EQUIPMENT	APPROX LOAD ADC
1		
2		
3		
4		
5		
6		

*SELECT THE WIRE SIZE BASED ON A MAXIMUM



FUSE
(F)

REVISION			
ZONE	REV	DESCRIPTION	DATE

TABLE 6
"GRASSHOPPER" FUSE DISTRIBUTION DATA TABLE

APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	BODY COLOR	NSN	TYPE
1-1/3	20 TO 14		WHITE	5920-00-156-0838	35B
2	18 TO 12		ORANGE	5920-00-556-9726	35L
3	14 TO 10		BLUE	5920-00-156-0837	35G
5	14 TO 8		GREEN	5920-00-122-3775	35H
7.5	12 TO 8			5920-00-857-8418	GTE D27087A11
10	12 TO 6			5920-00-624-2661	BURNDY FILLOITS

* MAXIMUM VOLTAGE DROP FOR THE LOOP OF - 0.35-V DC.

TABLE 6
GNT FUSE DISTRIBUTION DATA TABLE

APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN	TYPE
1	18 TO 14		GRAY	5920-00-901-9936	GNT 1
2	18 TO 12		ORANGE	5920-00-857-8933	GNT 2
3	14 TO 10		BLUE	5920-00-081-5958	GNT 3
3.5	14 TO 10			5920-01-056-7256	GNT 3-1/2
5	14 TO 8		GREEN	5920-00-857-8417	GNT 5
10	12 TO 6		RED/WHITE	NSN	GNT 10

* MAXIMUM VOLTAGE DROP FOR THE LOOP OF - 0.35-V DC.

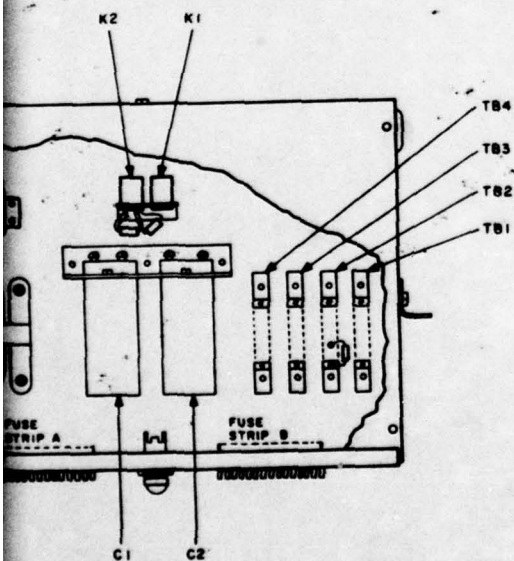


FIGURE 9
FUSE PANEL 58-3800/FTC
(FILTERED, GNT FUSES)

DESIG NO STD-MS-0019		SUBMITTAL NO D 50470		DRAWING NO	
DESIGNED BY S. D. N.		CHECKED BY H. M. S.		DATE	
APPROVED BY		REVIEW		DATE	

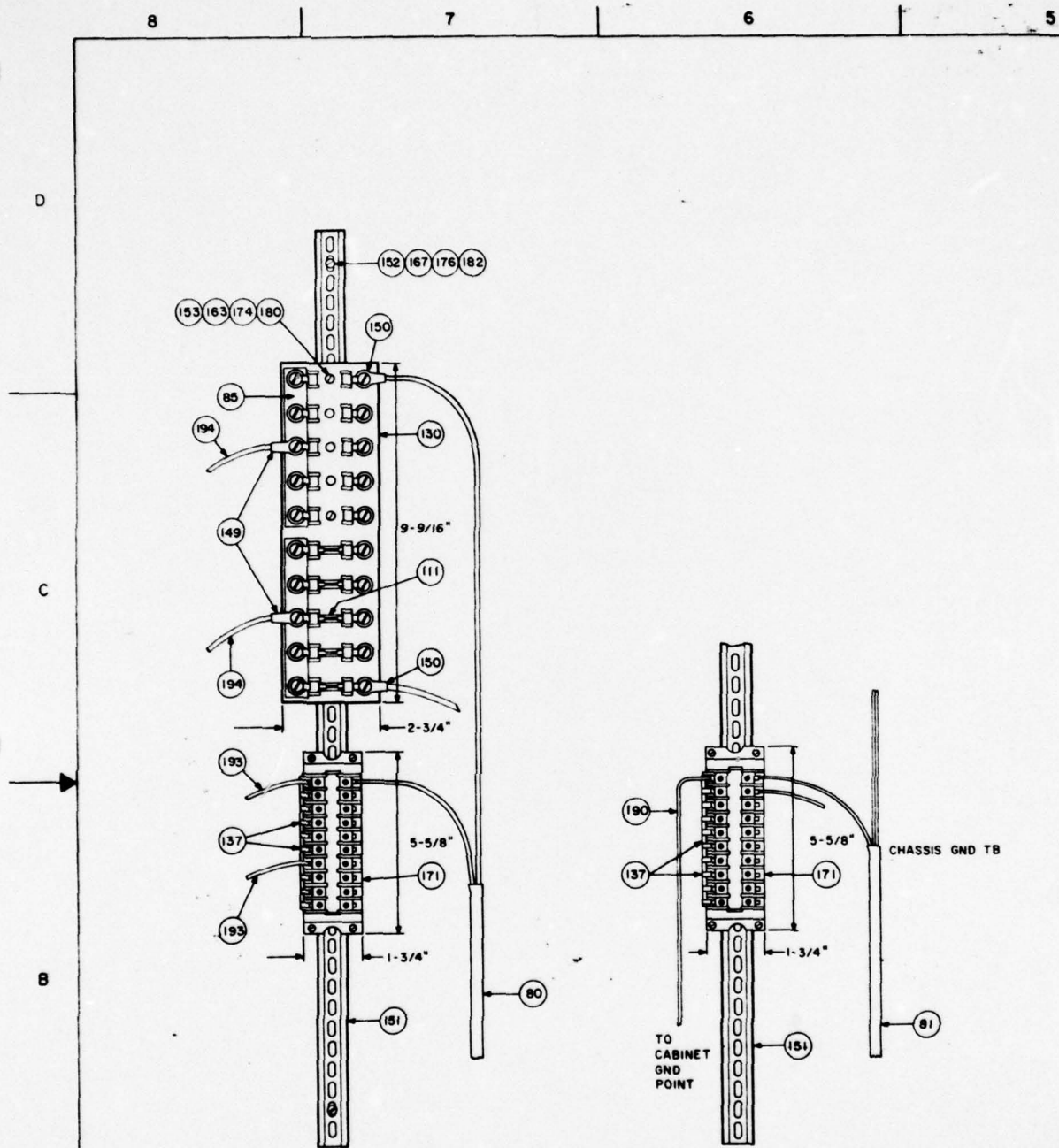


FIGURE 10
48V DC FUSE AND TERMINAL BLOCK
MOUNTING AND WIRING

FUSE NO.	RATING A	WIRE SIZE (NOTE)
1	1 NORMAL	18
2	2 NORMAL	18
3	3 NORMAL	18
4	5 NORMAL	16
5	8 NORMAL	14
6	10 NORMAL	14
7	15 NORMAL	12
8	5 SLO-BLO	16
9	10 SLO-BLO	14
10	15 SLO-BLO	12

FUSE NO	RATING A	WIRE SIZE AWG (NOTE 803)
1	1	#18
2	2	#18 TO 14
3	3	#18 TO 14
4	4	#16 TO 14
5	5	#16 TO 14
6		
7		

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

TABLE 7

CABINET FUSE ASSIGNMENTS

CAB#

WIRE SIZE, AWG (NOTE 803)	EQUIP	MAX LOAD, A (TYPICAL)	FUSE TYPE	MFR'S NO.
18		0.5	5 AG	LITTLEFUSE 512001
18		1.1	5 AG	LITTLEFUSE 512002
18		2.0	5 AG	LITTLEFUSE 512003
16		2.8	5 AG	LITTLEFUSE 512005
14		6	5 AG	LITTLEFUSE 514008
14		7	5 AB	LITTLEFUSE 514010
12		9	5 AB	LITTLEFUSE 514015
16		3.2	5 AB	LITTLEFUSE 523005
14		7.5	5 AB	LITTLEFUSE 523010
12		10.5	5 AB	LITTLEFUSE 523015
TOTAL				

NOTES:

801. MOUNT THE FUSE AND TERMINAL BLOCK ASSEMBLIES ON THE LEFT SIDE OF CABINET (FACING REAR).
802. IF THE EQUIPMENT REQUIRES A CHASSIS GROUND CONNECTION, A GROUNDING BLOCK CAN BE ADDED ON THE CHANNEL BELOW THE 48-V RTH (+) BLOCK. A 3-CONDUCTOR POWER CORD IS REQUIRED, CONNECTED AS SHOWN.
803. SELECT THE WIRE SIZE BASED ON A MAXIMUM DROP FOR THE LOOP OF 0.35V DC.

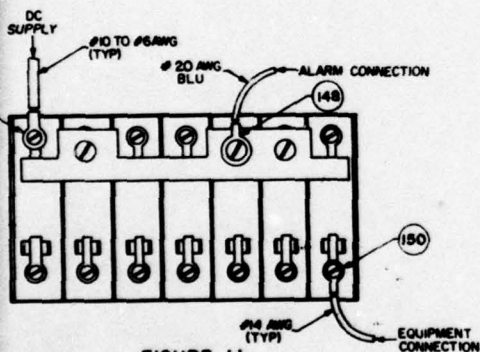


FIGURE 11

BUSS FUSE TERMINAL BLOCK

TABLE 8

BUSS FUSE BLOCK FUSE ASSIGNMENTS

AWG (803)	EQUIP	MAX LOAD, A (TYPICAL)	FUSE TYPE	NSN	MFR
		0.5		5920-00-869-0515 5920-00-195-2330	BUSS LITTLEFUSE
TO 14		1.1		5920-00-295-7013 5920-01-007-5676	BUSS LITTLEFUSE
TO 14		1.9		5920-00-503-4843 5920-00-133-4898	BUSS LITTLEFUSE
TO 12		2.6		5920-00-808-3152	BUSS
TO 12		3.5		5920-01-007-5677	LITTLEFUSE

STD-MS-0019

SHEET 5 OF 18

DESIGN BY S.D.N.

APPROVED H.M. Selzer

TYPE / SPEC NO

D 50470

SCALE NONE

DRAWING NO

SHEET 5

2

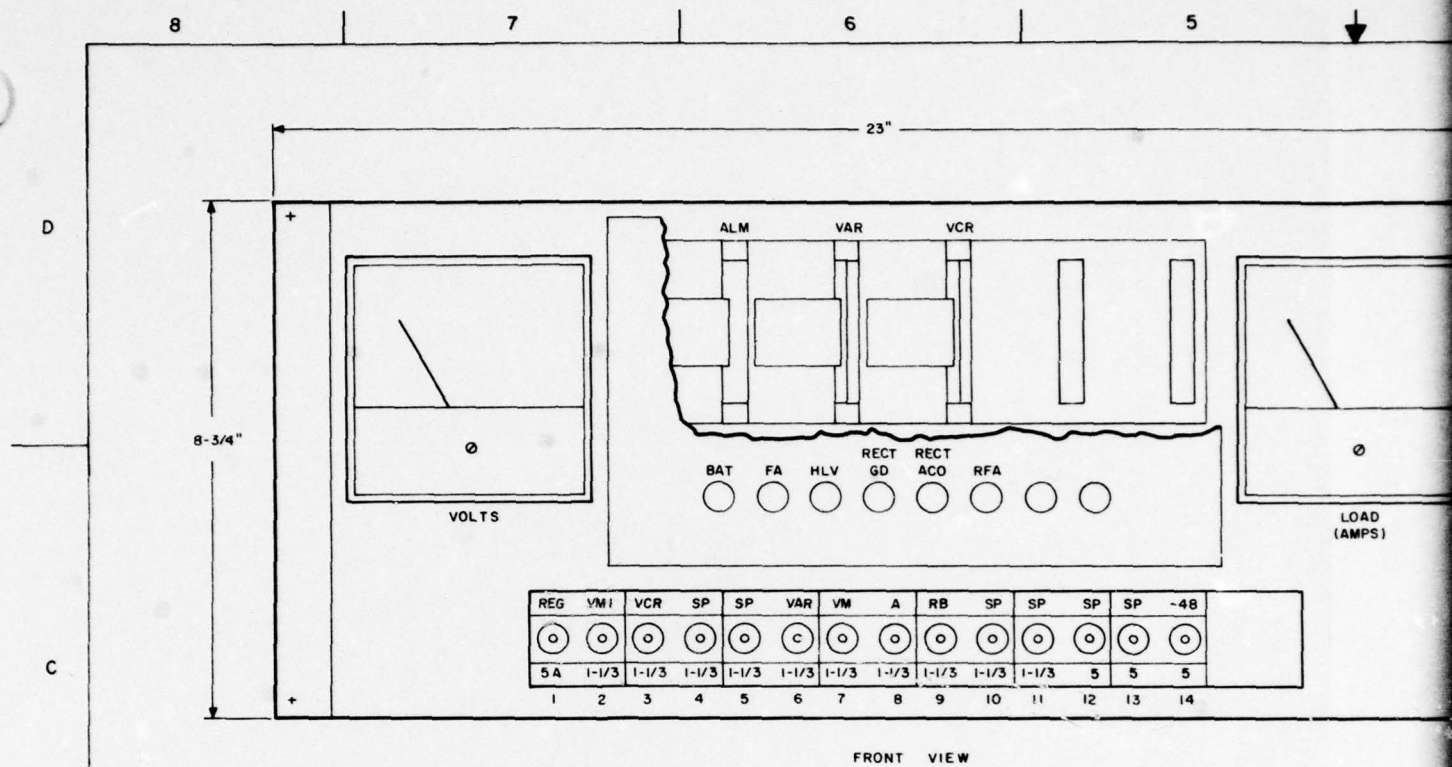


FIGURE 12
METER & CONTROL PANEL LAYOUT

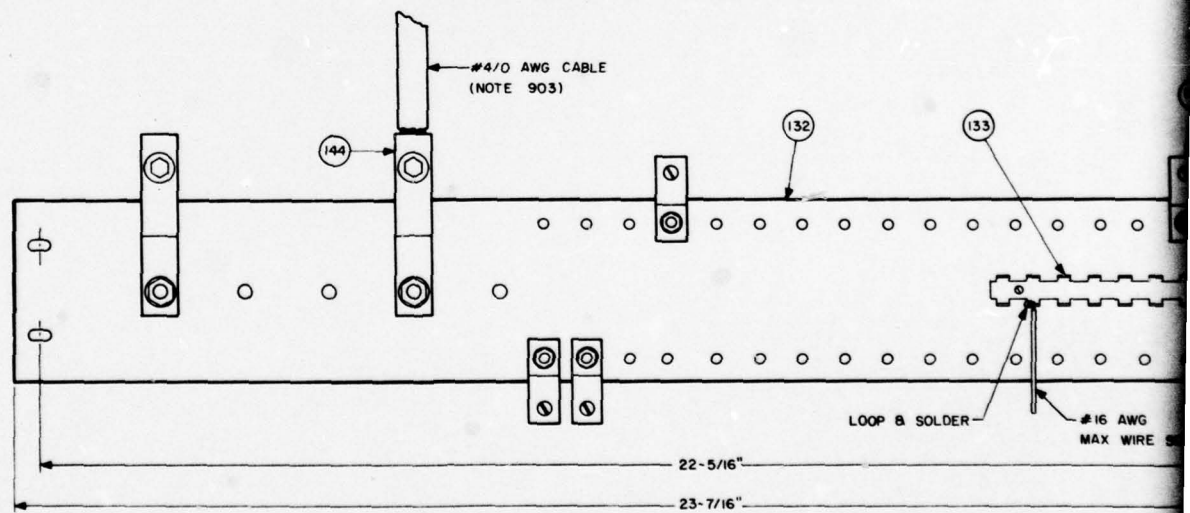


FIGURE 13
48V DC RTN BUS BAR WIRING
(NOTE 901 & 902)

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

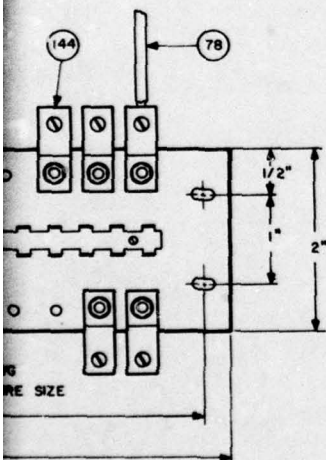
901. AFTER INSTALLING ALL EQUIPMENT AND FUSE PANELS IN FRONT OF THE RACK, MOUNT THE 48-V DC RETURN BUS BAR AT THE TOP REAR OF THE RACK. SEE FIGURE 5 FOR THE LOCATION. USE THE LORAIN INSULATING MOUNTING KIT.
902. AFTER INSTALLATION, CHECK EACH BAR WITH AN OHMMETER TO THE RACK BARE METAL TO ENSURE THAT IT IS INSULATED.
903. FORM THE 4/0 AWG CABLES TO RELIEVE STRESS ON THE BUS BAR.

D

C

B

A



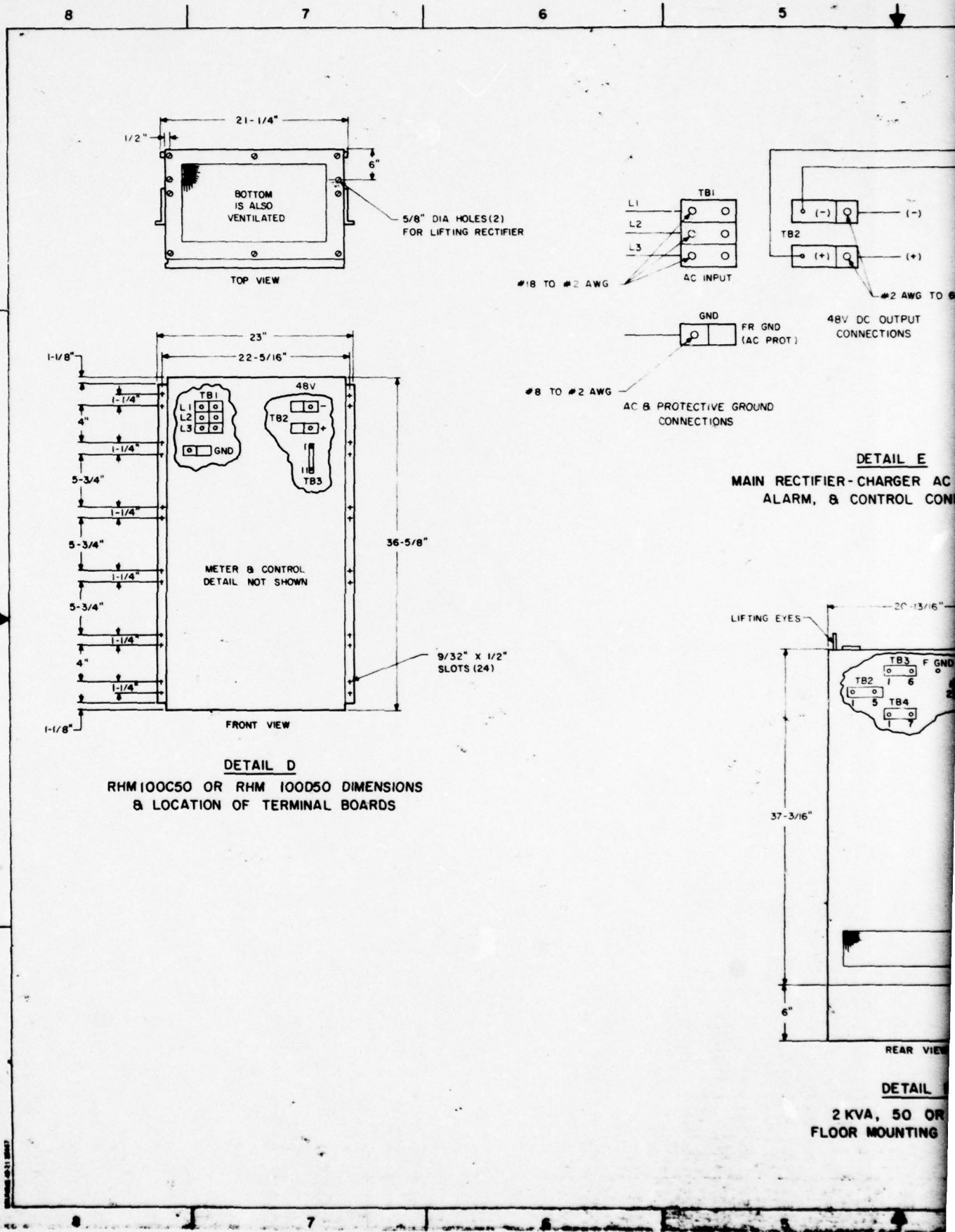
IDENT NO.	STD-MS-0019	SIZE / YSCW NO.	D 50470	DRAWING NO.	
SHEET 9 OF 18					
DRAWN BY	G VERDI	SCALE	NONE		
APPROVED	<i>H. M. S. L.</i>				

4

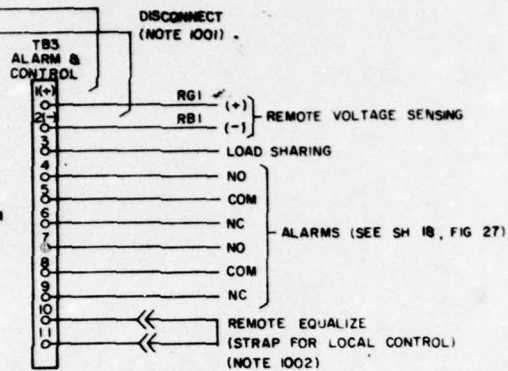
3

2

1



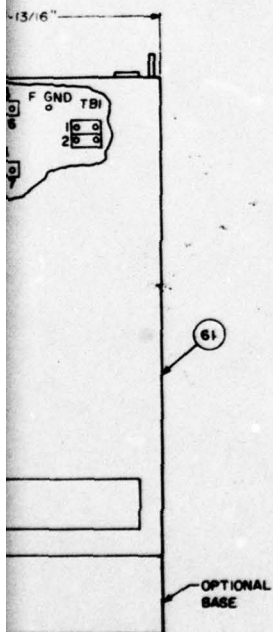
REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES:

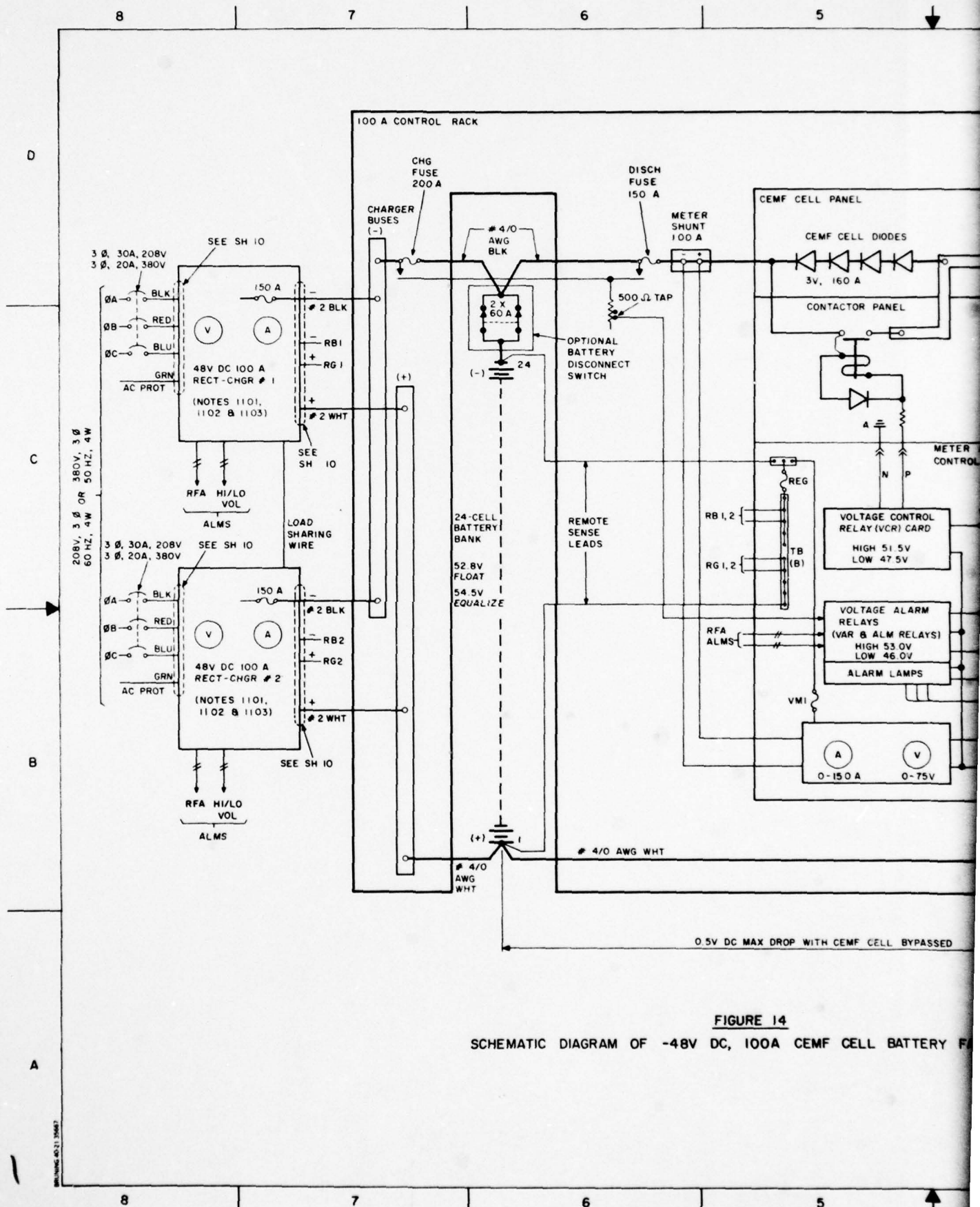
1001. DISCONNECT AND TAPE THE LOCAL SENSE LEADS. CONNECT THE REMOTE BATTERY VOLTAGE SENSING WIRES.
1002. CHECK TO ENSURE THAT THIS CONNECTION IS IN PLACE FOR LOCAL EQUALIZE SWITCHING. REFER TO THE RECTIFIER-CHARGER INSTRUCTION MANUAL.

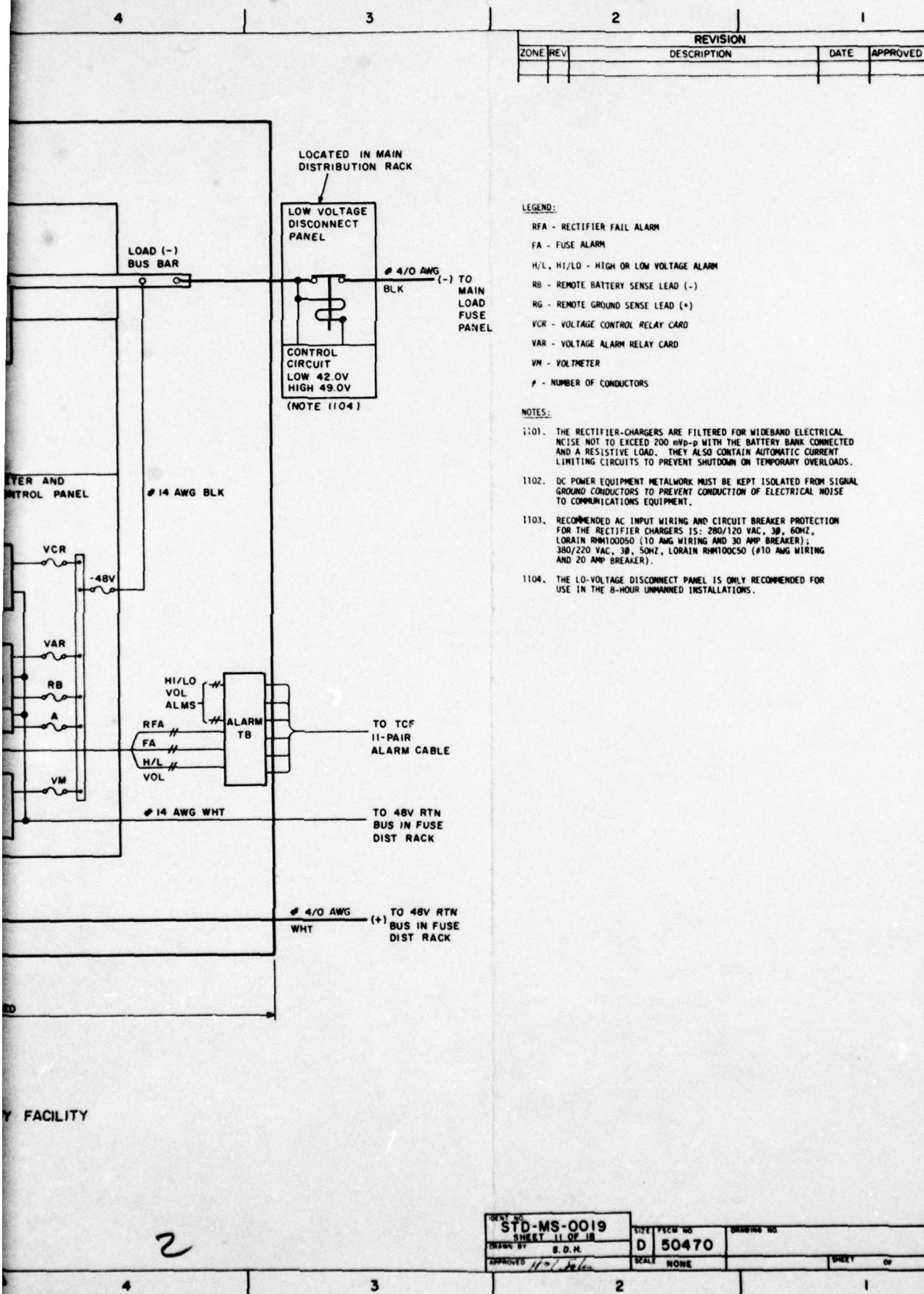
E
R AC & DC POWER,
CONNECTIONS

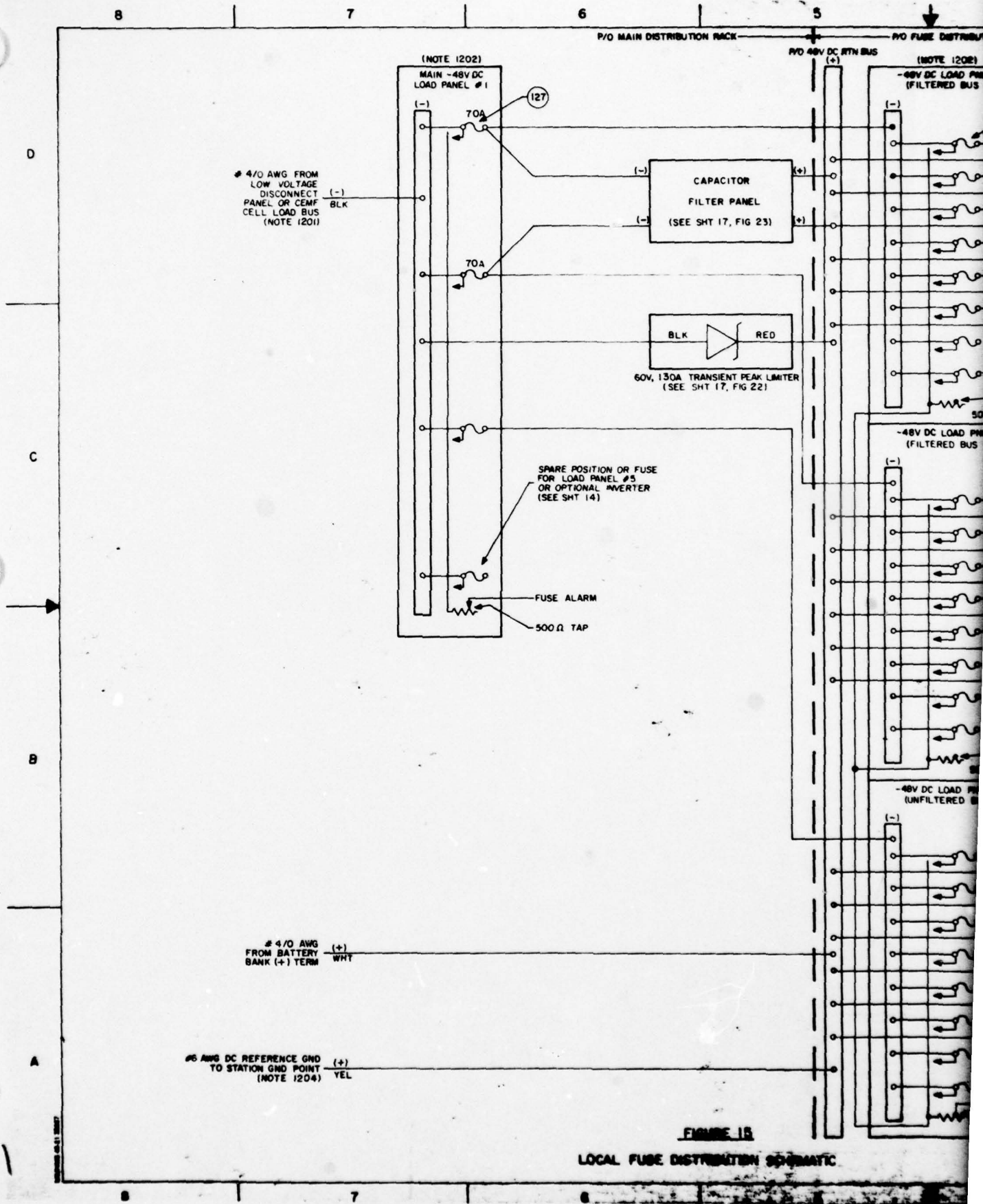


R VIEW
TAIL F
D OR 60HZ
TING INVERTER

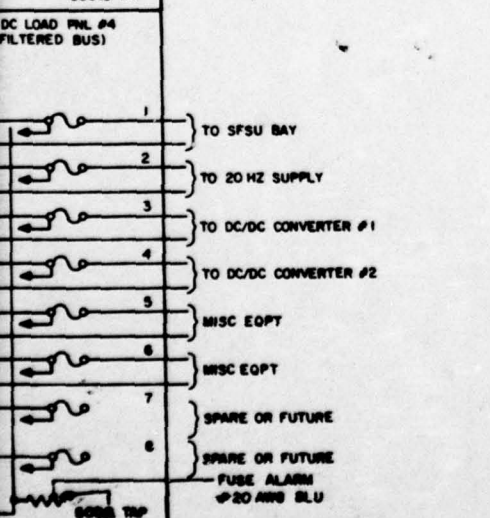
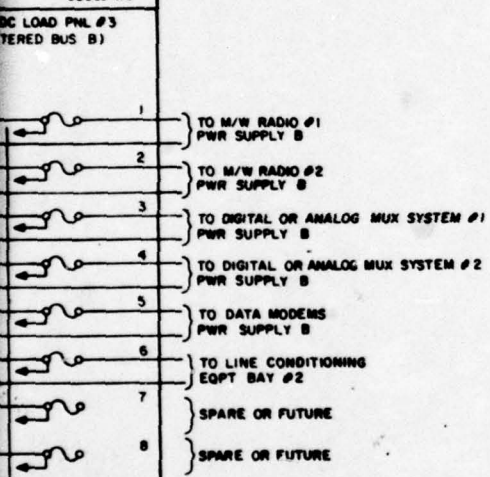
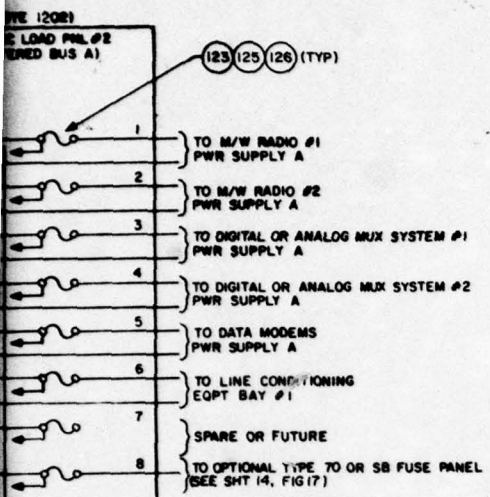
STD-MS-0019		SIZE	PSCH 100	DRAWING NO.
SHEET 10 OF 18		D	50470	
DESIGN BY G. VERDI		SCALE	NONE	SHEET OF
APPROVED H.M. S.L.				







DISTRIBUTION BACK



TYPICAL DISTRIBUTION TO ELECTRICALLY "QUIET" LOADS (NOTE 1203)

TYPICAL DISTRIBUTION TO ELECTRICALLY "NOISY" LOADS (NOTE 1203)

REVISION			
ZONE	REV	DESCRIPTION	DATE

- NOTES:
- 1201. THE 1.0-VOLTAGE DISCONNECT PANEL IS ONLY RECOMMENDED FOR USE IN THE 8-HOUR UNMANNED INSTALLATION.
 - 1202. ACTUAL FUSING AND DISTRIBUTION WIRE SIZES WILL DEPEND ON LOADS AND LOOP DISTANCE TO THE EQUIPMENT BEING SUPPLIED.
 - 1203. THE DISTRIBUTION SHOWN IS TYPICAL FOR A MICROWAVE TERMINAL STATION AND DOES NOT REPRESENT ANY ACTUAL DISTRIBUTION. THE NUMBER AND TYPE OF LOAD PANELS USED MUST BE CHOSEN FOR SPECIFIC REQUIREMENTS.
 - 1204. THE DC REFERENCE GROUND CONDUCTOR SHOULD BE CONNECTED TO THE MAIN STATION GROUND POINT (IN GROUND BOX) OR AS CLOSE TO THE EXTERIOR EARTH GROUND ELECTRODE NETWORK AS POSSIBLE.

REV TO: STD-MS-0019
 DESIGNED BY: L. H. LEE
 CHECKED BY: H. M. S. L.
 DATE: 50470
 DRAWN BY: 5000
 DATE: 5000

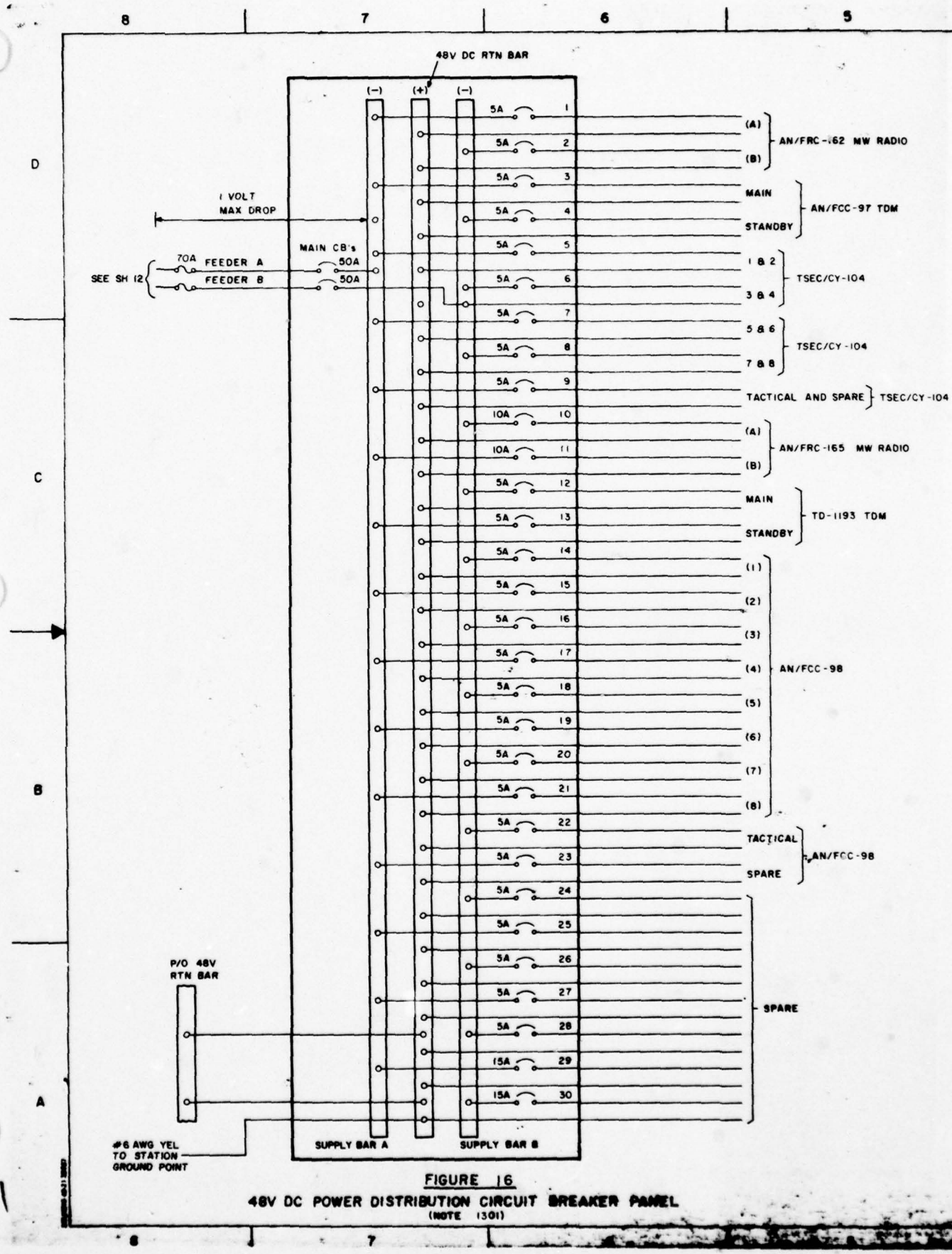


FIGURE 16
48V DC POWER DISTRIBUTION CIRCUIT BREAKER PANEL
(NOTE 1301)

4

3

2

		REVISION		DATE	APPROVED
ZONE	REV	DESCRIPTION			

LEGEND:

SA CIRCUIT BREAKER WITH RATING.

NOTES:

1.301. THIS PANEL IS WALL-MOUNTED NEAR THE COMMUNICATIONS EQUIPMENT SUPPLIED. MORE THAN ONE PANEL CAN BE USED.

2

WORK NO.	STD-MS-0019	REV	0	DATE	50470	DESIGN NO.	
DRAWN BY	S.D.H.	FILE	NO.000	DATE		BY	
CHECKED BY	NOT S.D.						

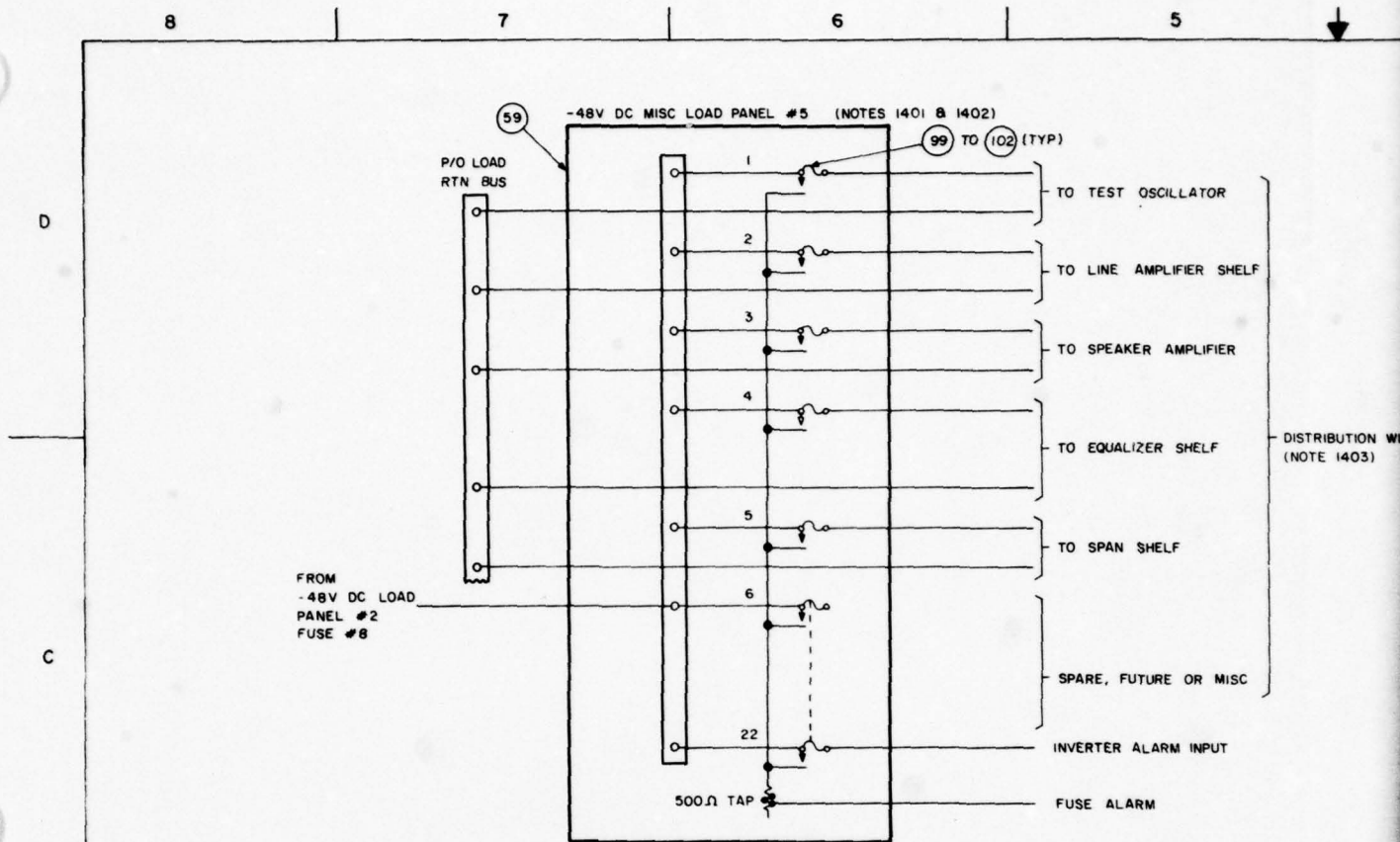


FIGURE 17
OPTIONAL MISCELLANEOUS 48V DC
DISTRIBUTION WIRING

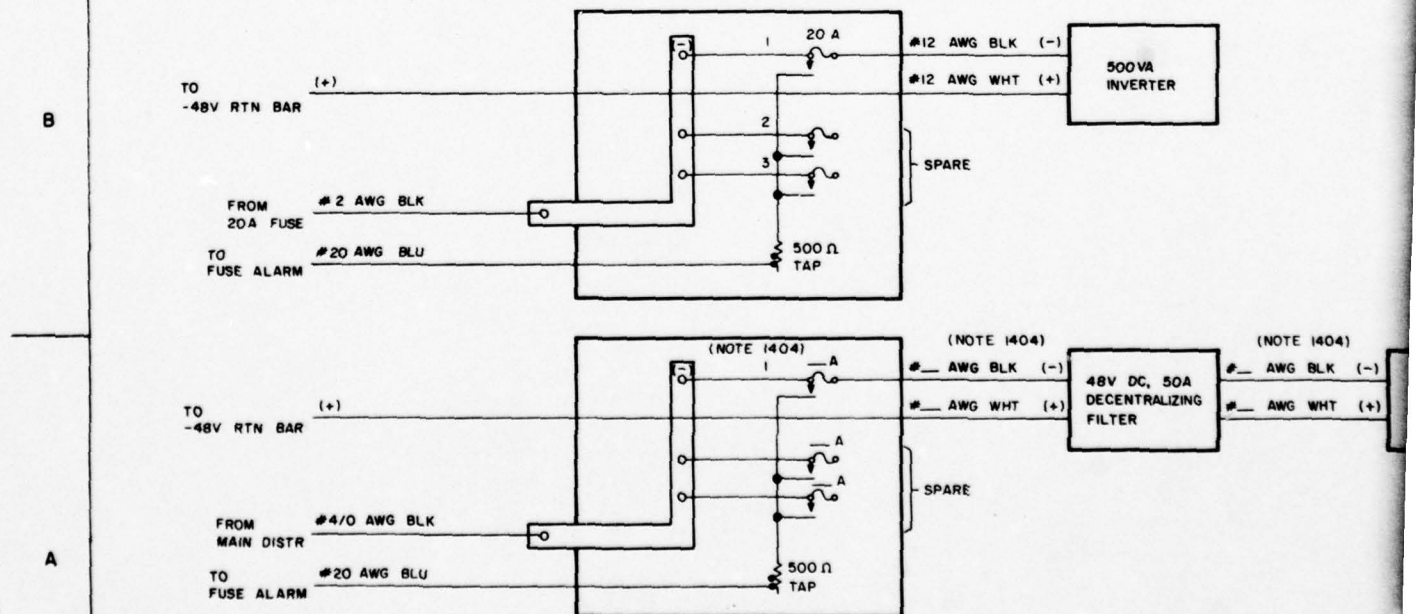


FIGURE 18
500VA, 1KVA & 2KVA INVERTER
DISTRIBUTION & FILTERING

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

- 1401. THE MISCELLANEOUS FUSE PANELS ARE OPTIONAL AND WILL DEPEND ON STATION CONFIGURATION.
- 1402. TYPICAL FUSING FOR THESE PANELS WILL BE 1-1/3 TO 5 AMPS.
- 1403. DISTRIBUTION WIRE SIZES WILL DEPEND ON ACTUAL LOAD AND LOOP DISTANCE TO THE EQUIPMENT.
- 1404. SELECT THE FUSE RATING AND WIRE SIZE FROM TABLE 9.

ION WIRING
(03)

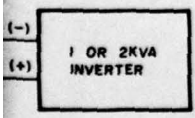
TABLE 9		
INVERTER	1-KVA	2-KVA
FUSE SIZE, AMPS	35	60
WIRE SIZE, AWG (FOR LOOPS <20')	8	6

D

C

B

A



2

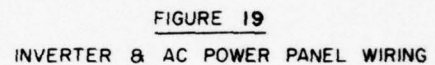
PROJECT NO. STD-MS-0019	SHEET 19 OF 18	SIZE D	FIG. NO. 50470	DRAWING NO.
DRAWN BY G. VERDI	APPROVED <i>[Signature]</i>	SCALE NONE	SHEET OF	

4

3

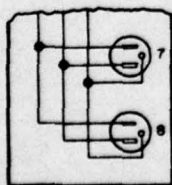
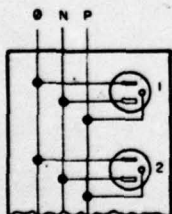
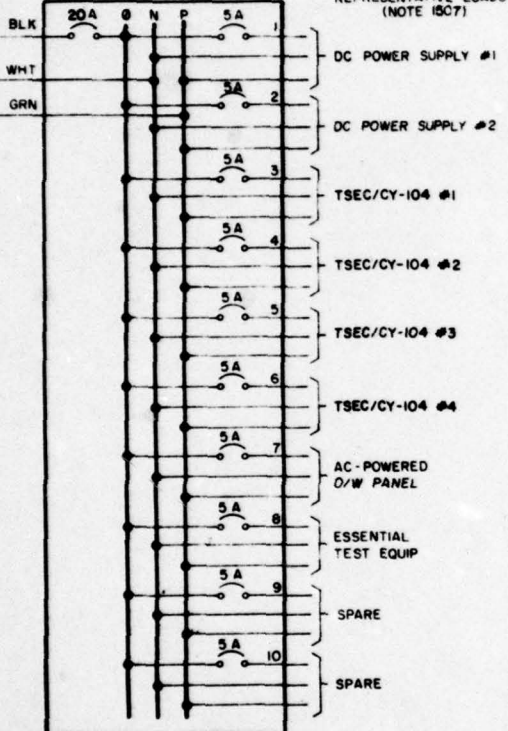
2

1



120V AC, 10, 3W, INVERTER AC POWER PANEL
FOR 1KVA OR LARGER INVERTER

(NOTE 1504)



(NOTE 1505)

FIGURE 20

INVERTER 120V AC POWER
OUTLET STRIP IN CABINET

REVISION			
ZONE	REV.	DESCRIPTION	DATE

NOTES:

1501. AN L-C DECENTRALIZING FILTER IS NOT REQUIRED WITH THE 500VA INVERTER.
1502. A SYNCHRONIZER CIRCUIT CAN BE USED IF THE INVERTER FREQUENCY MATCHES THE PRIMARY POWER.
1503. THE AUTOMATIC TRANSFER SWITCH IS FACTORY INSTALLED AS PART OF THE INVERTER.
1504. THE INVERTER POWER PANELS SHOULD BE INCLUDED IN THE EIP.
1505. THE INVERTER 120-V AC POWER OUTLET STRIP IS IN ADDITION TO THE REGULAR UTILITY POWER OUTLET STRIP PROVIDED AS PART OF THE CABINET. THE TWO STRIPS CAN BE MOUNTED ON OPPOSITE SIDES. LABEL EACH.
1506. IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
1507. THE TOTAL LOAD MUST BE LIMITED TO THE MAXIMUM CAPACITY OF THE INVERTER.

FORM NO. STD-MS-0019		SIZE 1/2" X 11" X 11"		PAGE NO. 1	
DRAWN BY: G. VERDI		DATE: 50470		CHECKED BY:	
APPROVED: [Signature]		SCALE: NONE		DATE: 50470	

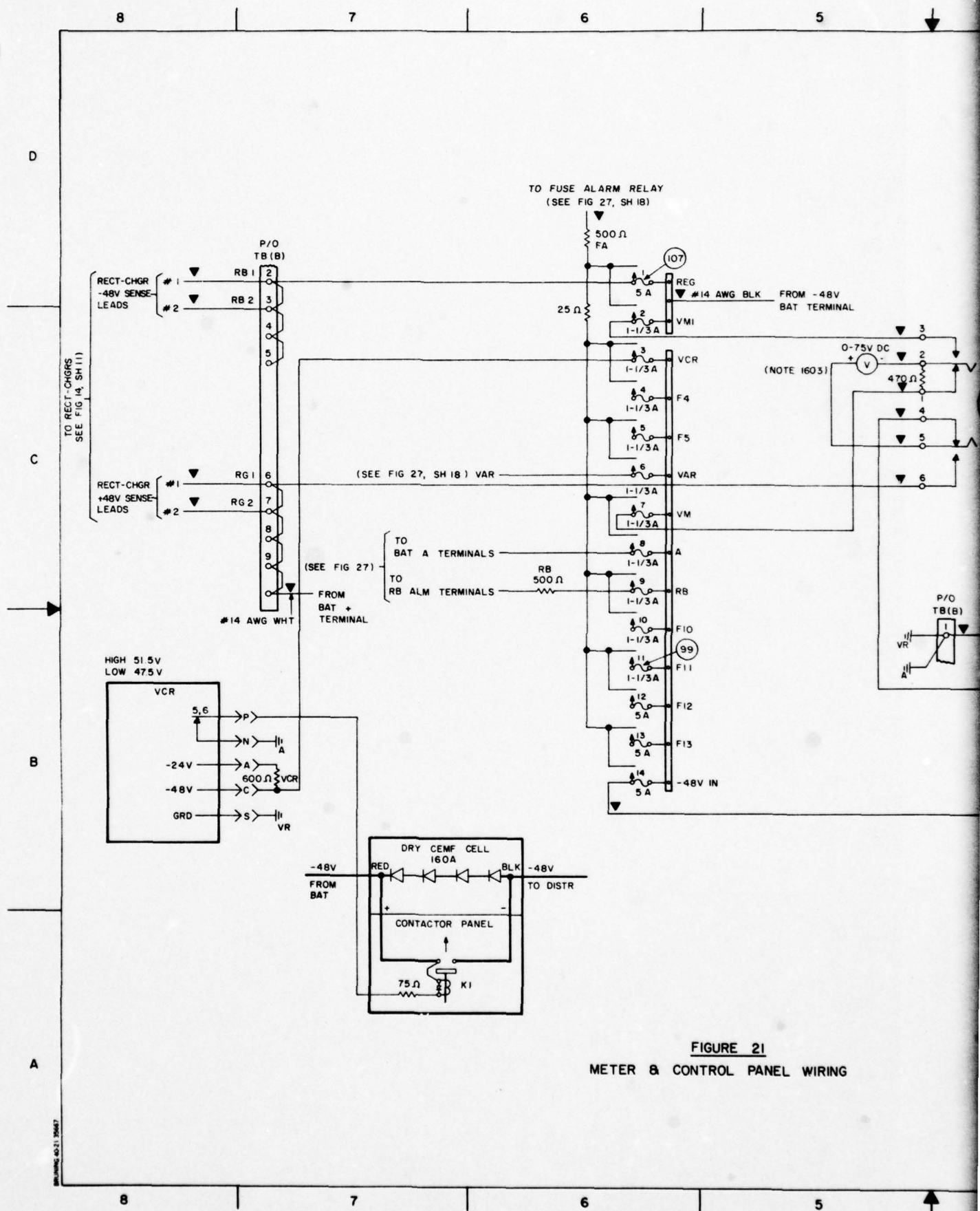


FIGURE 21
METER & CONTROL PANEL WIRING

4 3 2 1

REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

RB - REMOTE BATTERY SENSE LEAD (-)

RG - REMOTE GROUND SENSE LEAD (+)

VM - VOLTMETER

▼ - INSTALLER WIRING

(SEE SHEET 18 FOR OTHER LEGEND)

NOTES:

1601. DISTRIBUTION CABINET LOAD BAR VOLTAGE.

1602. REPLACE THE EXISTING 1C KEY SWITCH WITH THE 2C KEY SWITCH.

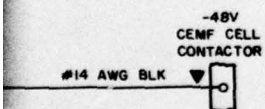
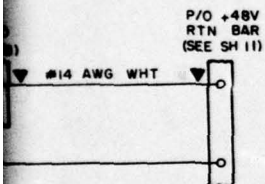
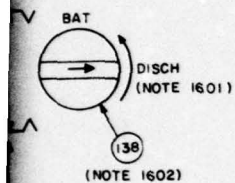
1603. CHECK THE METER WITH AN EXTERNAL METER TO VERIFY ACCURACY.

D

C

B

A



2

IDENT NO STD-MS-0019		SIZE / PSCN NO D 50470		DRAWING NO	
SHEET 19 OF 19					
DRAWN BY G VERDI		SCALE NONE		SHEET OF	
APPROVED <i>[Signature]</i>					

4 3 2 1

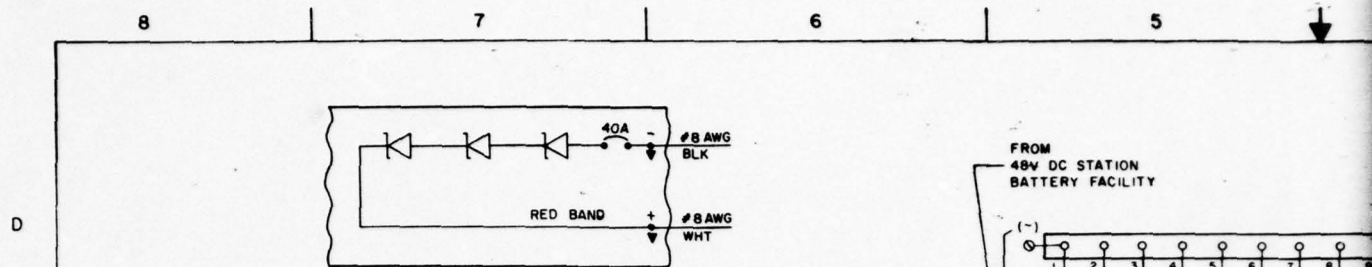


FIGURE 22

60V, 130A DC TRANSIENT PEAK LIMITER PNL SCHEMATIC

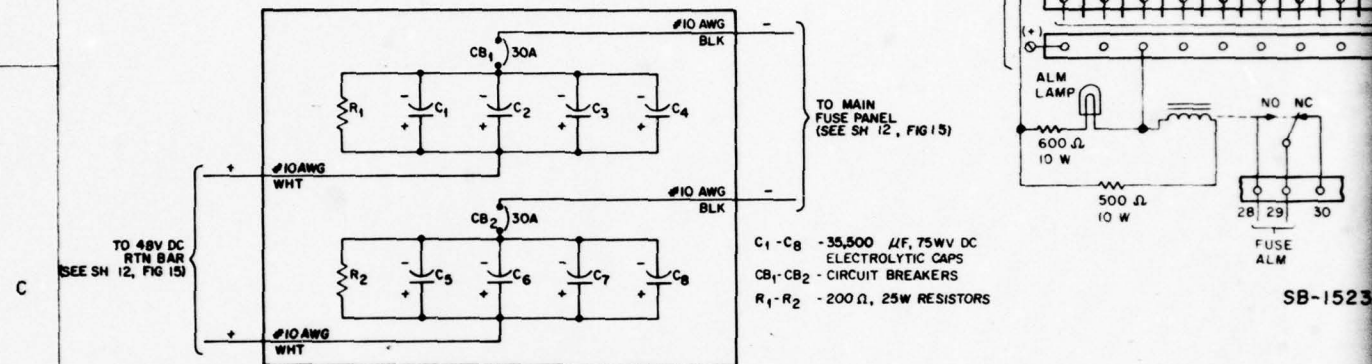


FIGURE 23

CAPACITOR FILTER PANEL SCHEMATIC DIAGRAM

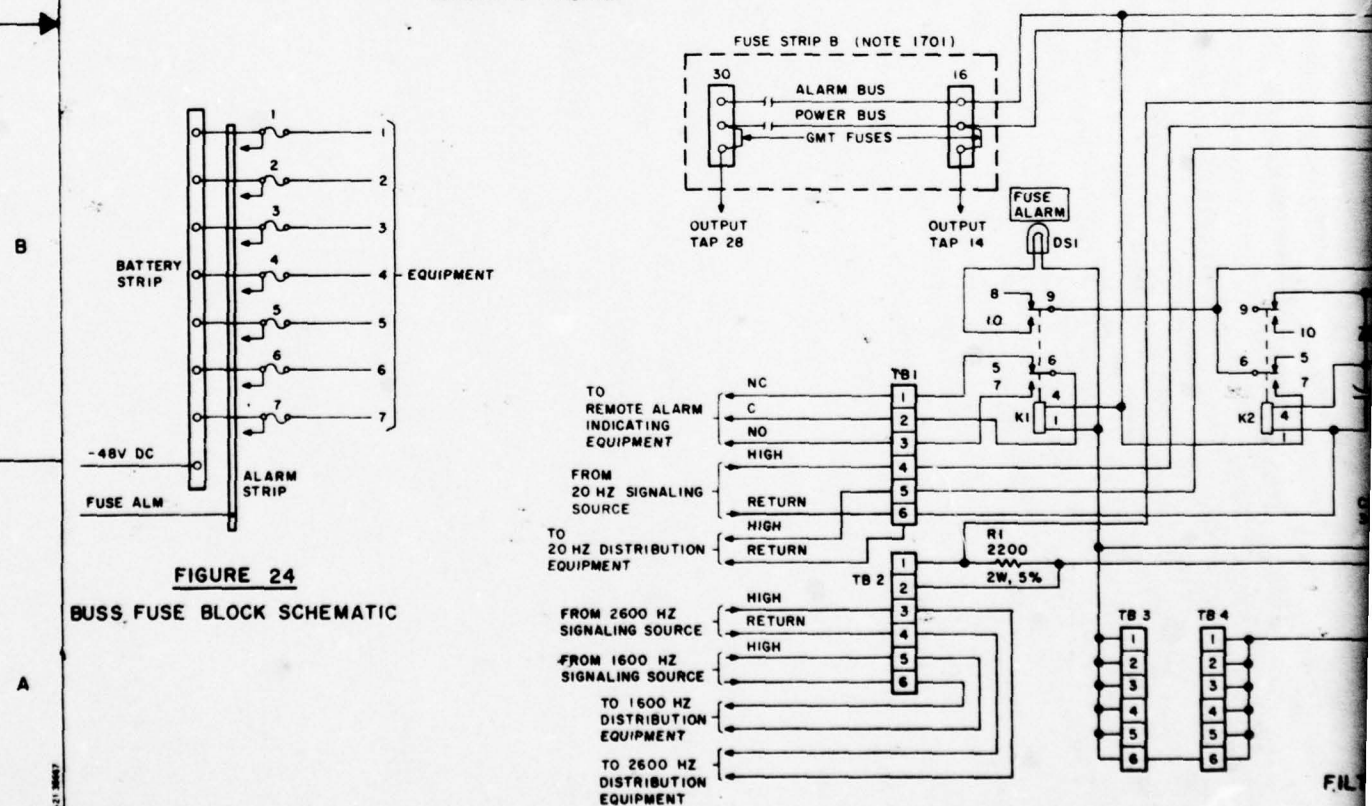
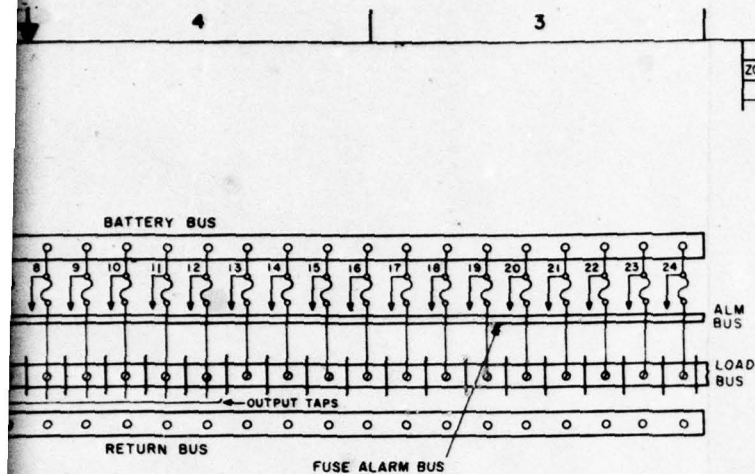


FIGURE 24

BUSS FUSE BLOCK SCHEMATIC

SB-1523



REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

1701. FUSE STRIP B IS USED ONLY IN THE 30 FUSE (STELMA FP-30) CONFIGURATION.
1702. FOR MORE INFORMATION REFER TO TH 11-5805-666-14P.

FIGURE 25

B-1523/FT FUSE PANEL SCHEMATIC

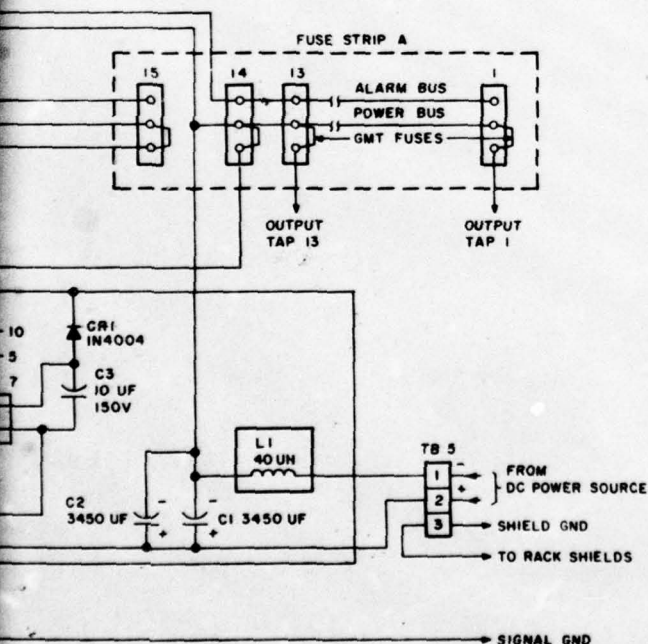
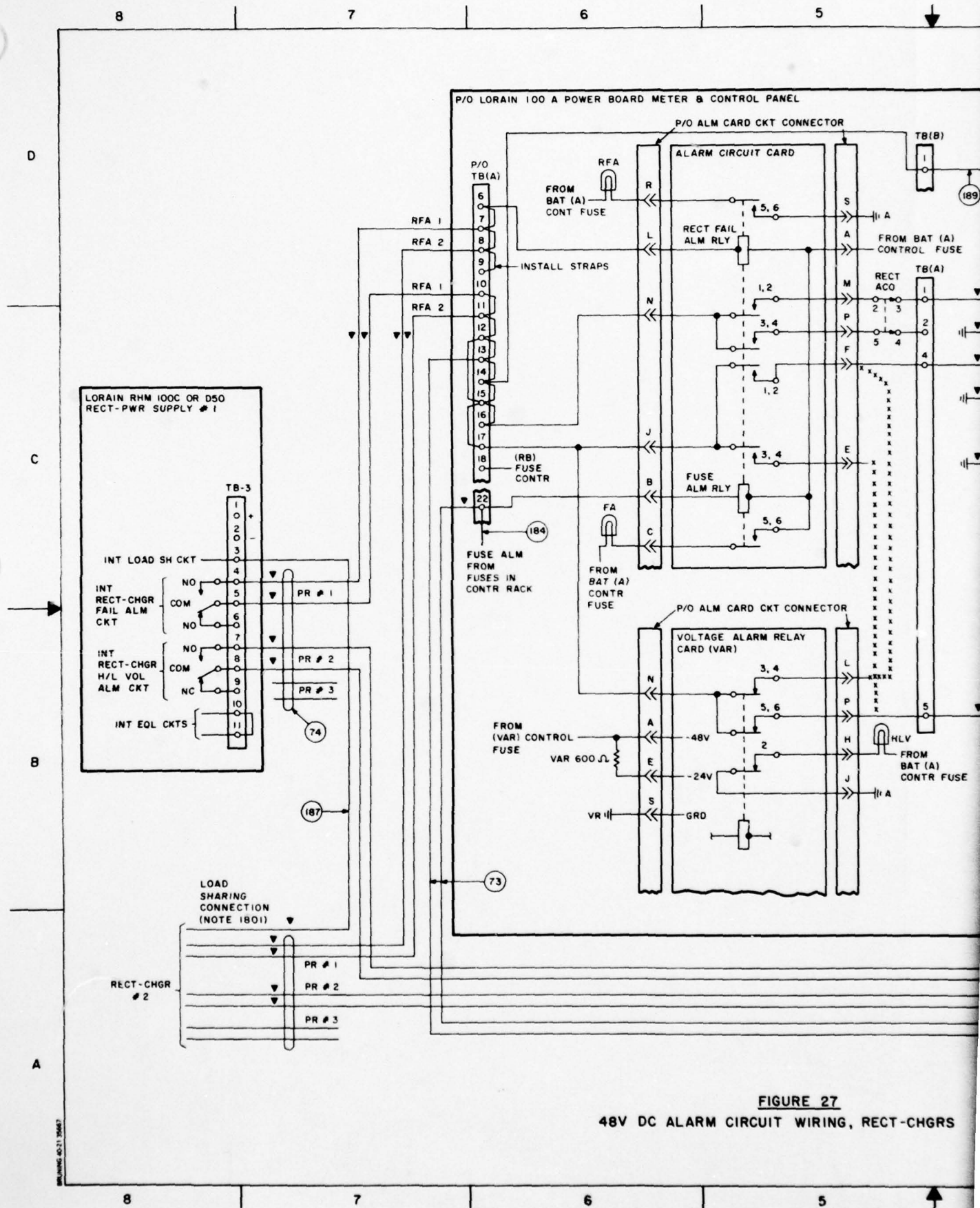


FIGURE 26

FILTERED GMT FUSE PANEL SCHEMATIC
SB-3800/FTC
(NOTE 1702)

STANDARD SHEET 17 OF 18		SIZE: TECH NO D 50470	DRAWING NO
DESIGNED BY S. D.H.	SCALE NONE	SHEET OF	
APPROVED <i>Ray S. Sch...</i>			



4

3

2

1

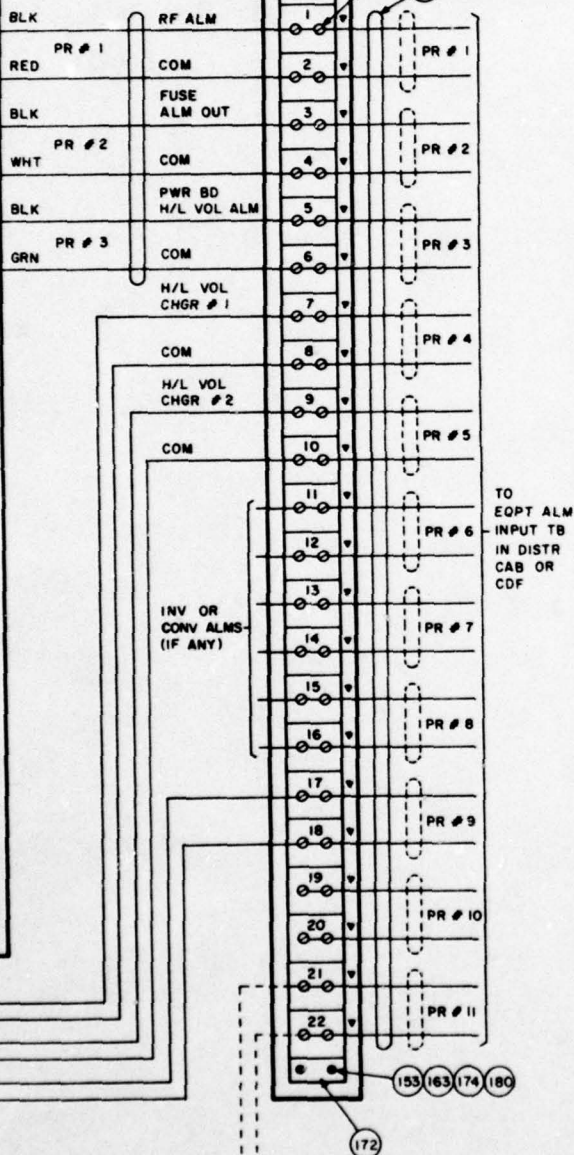
REVISION			
ZONE	REV	DESCRIPTION	DATE

14 AWG
WHT TO 48V DC
RTN BAR

ALARM TERMINAL BLOCK PANEL

(NOTE 1802)

146
75 (REF)



LEGEND:

NO NORMALLY OPEN CONTACT
NC NORMALLY CLOSED CONTACT
COM MOVABLE CONTACT COMMON TO ABOVE OR RETURN LEAD
H/L V HIGH/LOW VOLTAGE
FA FUSE ALARM
RFA RECTIFIER FAIL ALARM
RECT ACO RECTIFIER ALARM CUTOFF KEY
RECT GD CUTOFF LIGHT
VAR VOLTAGE ALARM RELAY
VCR VOLTAGE CONTROL RELAY
XXX WIRING TO BE REMOVED
▽ INSTALLER WIRING
A ↓ POWER BOARD TB (A) 48-V RETURN CONNECTION
VR ↓ VOLTAGE RELAY CARD GROUND RETURN
GRD GROUND RETURN

NOTES:

1801. INTERCONNECT THE LOAD SHARING WIRE BETWEEN THE RECTIFIER-CHARGERS.
1802. SEE FIGURE 5 OF THIS DRAWING FOR MOUNTING INFORMATION.
1803. USE SOUND-POWERED PHONES OR OTHER INTERCOM TERMINALS (NOT PROVIDED).

FOR
INTERCOM USE
(NOTE 1803)

STD-MS-0019

SHEET 18 OF 18

DRAWN BY S. D. H.

APPROVED H. P. G. L.

TYPE PFCW NO
D 50470

SCALE NONE

DRAWING NO

SHEET OF

D

C

B

A

8			7		
239	03517H	WIRE, ELEC, TW, STR, 4 AWG, BLK, INS, 600V	6145-00-184-5488	FT	
238	03500B	WIRE, ELEC, TW, STR, 4 AWG, WHT, INS, 600V	6145-00-184-3876	FT	
237	24863C	WIRE, SINGLE COND, STR INS, 600V, 4/0 AWG BLK	6145-00-050-9079	FT	
236	19725B	WIRE, SINGLE COND, STR INS, 600V, 4/0 AWG WHT	6145-00-417-5773	FT	
235	23986F	WIRE, ELEC, 4 AWG YEL, ANIXTER 68-0401	NSNR	FT	
234	03518W	WIRE, ELEC, TW, STR, 6 AWG, BLK, INS, 600V	6145-00-923-2220	FT	
233	03501C	WIRE, ELEC, TW, STR, 6 AWG, WHT, INS, 600V	6145-00-943-0728	FT	
232	03570N	WIRE, SINGLE COND, 8 AWG BLK, SOL, INS, 600V	6145-00-470-8255	FT	
231	06535A	WIRE, SINGLE COND, 8 AWG WHT, SOL, INS, 600V	6145-00-479-0042	FT	
230	03538G	WIRE, SINGLE COND, 10 AWG BLK, SOL, INS, 600V	6145-00-990-2999	FT	
229	03507W	WIRE, SINGLE COND, 10 AWG WHT, SOL, INS, 600V	6145-00-990-3000	FT	
228	09004N	WIRE, ELEC, TW, 12 AWG, YEL, SOL, INS, 600V	NSNR	FT	
227	03509A	WIRE, 14 AWG, WHT, SOL, 600V, INS	6145-00-050-7407	FT	
226	03540K	WIRE, 14 AWG, BLK, SOL, 600V, INS	6145-00-050-7405	FT	
225	11672A	WIRE, ELEC, TW, 18 AWG RED, SOL, INS, 600V	6145-00-089-6811	FT	
224	23193Y	WIRE, ELEC, TW, 18 AWG BLK, STR, INS	6145-00-524-9130	FT	
223	09217J	WIRE, ELEC, TW, 18 AWG WHT, STR, INS	6145-00-681-8374	FT	
222	16954C	WIRE, ELEC, TW 20 AWG BLU STR, BELDEN 8919-13	NSNR	FT	
221	00586C	WASHER, LOCK, SPLIT, STEEL, 3/8"	5310-00-637-9541	EA	
220	10231A	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, 1/4"	5310-00-808-5381	EA	
219	00483J	WASHER, LOCK, SPLIT, STEEL, #10	5310-00-045-3296	EA	
218	09019J	WASHER, LOCK, SPLIT, STEEL, CAD PLTD, #8	5310-00-045-3299	EA	
217	19635Z	WASHER, LOCK, EXTERNAL TOOTH, BRONZE, 1/4"	5310-00-942-5109	EA	
216	08658A	WASHER, FLAT, STEEL, 3/8"	5310-00-087-7493	EA	
215	06124L	WASHER, FLAT, STEEL, 1/4"	5310-00-754-4337	EA	
214	14518W	WASHER, FLAT, STEEL, CAD PLTD, 1/4"	5310-00-141-1795	EA	
213	00488D	WASHER, FLAT, STEEL, #10	5310-00-167-0834	EA	
212	00487C	WASHER, FLAT, STEEL, CAD PLTD, #8	5310-00-167-0833	EA	
211	23913Z	VERTICAL SIDE SUPPORT SET, 87" LG, PAR-METAL, CYS-84, SET OF 4 WITH MTG BOLTS	NSNR	EA	
210	24998F	TRANSIENT PEAK LIMITER PANEL, 23" X 7" -60V, 260A 1AW DNG STD-MS-0023	NSNR	EA	
209	21704B	TRANSIENT PEAK LIMITER, 19" X 7" -60V, 260A 1AW DNG STD-MS-0023	NSNR	EA	
208	23199Z	TERMINAL STRIP, 22 POSITIONS, CURTIS 1522 ST	NSNR	EA	
207	21956A	TERMINAL BLOCK, SQUARE D, TYPE 9080-CA-10	5820-00-101-3310	EA	
206	13561K	TAPE, INSULATING, ELEC, BLACK 3/4" X 108"	5970-00-816-6056	RL	
205	23204E	TAPE, INS, ELEC, WHITE, 3/4" X 216", 1500 V	5970-00-295-8161	RL	
204	23202C	SWITCH, TOGGLE, DPDT, RADIO SHACK 275-1546	NSNR	EA	
203	21662C	SIDE PANEL FOR 31" DEEP CABINET, BLUE, PAR-METAL #CS-843	NSNR	EA	
202	00230J	SCREW, CAP 3/8-16 X 1-1/2", HEX HD STEEL	5305-00-022-7798	EA	
201	10130J	SCREW, MACH, STEEL, CAD PLTD, 1/4-20 X 1"	5305-00-988-1727	EA	
200	19640Y	SCREW, CAP, BRASS, 1/4-20 X 5/8"	5305-00-935-7581	EA	
199	13953E	SCREW, MACH, 12-24 X 3/4", PAN HEAD	5305-00-639-7970	EA	
198	19746A	SCREW, MACH, 10-32 X 3/4", PAR-METAL GSC10-3	5305-00-101-3733	EA	
197	24423C	SCREW, MACH, 10-32 X 1" LG, PAN HEAD	5305-00-059-7815	EA	
196	09098X	SCREW, MACH PAN HD STEEL CAD PLTD, 8-32 X 1"	5305-00-206-3713	EA	
195	21846A	PROTECTIVE SCREEN 23" X 36" LORAIN 4141-406	NSNR	EA	
194	21827D	PANEL, TERM, 23" X 3-1/2", LORAIN 4341-514	NSNR	EA	
193	23933H	PANEL, BLANK, 23" X 10-1/2", LORAIN 3536-101	NSNR	EA	
192	20978B	PANEL, BLANK, 23" X 8-3/4", LORAIN 3535-102	NSNR	EA	
191	20960E	PANEL, BLANK, 23" X 7", LORAIN 3534-103	5975-00-101-3513	EA	
190	20979C	PANEL, BLANK, 23" X 5-1/4", LORAIN 3533-106	5975-00-101-3512	EA	
189	20961F	PANEL, BLANK, 23" X 3-1/2", LORAIN 3532-112	NSNR	EA	
188	20942W	PANEL, BLANK, 23" X 1-3/4", LORAIN 3531-106	NSNR	EA	
187	03034K	PANEL, BLANK, 19" X 7" X 1/8", GREY	5975-00-051-7337	EA	
186	15288K	PANEL, BLANK, 19" X 5-1/4" X 1/8", GREY	5975-00-975-4448	EA	
185	08712Z	PANEL, BLANK, 19" X 3-1/2" X 1/8", GREY	5975-00-686-2541	EA	
184	00879Z	PANEL, BLANK, 19" X 1-3/4" X 1/8", GREY	5975-00-937-4583	EA	
183	24997E	PANEL, AC OUTLET, 19", 1AW DNG STD-MS-0017	NSNR	EA	
182	00558H	NUT, PLAIN, HEX, STEEL, CAD PLTD, 1/4-20	5310-00-285-1650	EA	
181	07675L	NUT, PLAIN, HEX, STEEL, CAD PLTD, #8-32	5310-00-550-2490	EA	
180	09727C	NUT, HEX, BRASS, 1/4-20	5310-00-141-3034	EA	
179	10674D	NUT, HEX, BRASS, #10-24	5310-00-616-6948	EA	
178	23942F	MOUNTING CHANNEL, SQUARE D, TYPE 1828-C22X38	NSNR	EA	
177	21718E	LUG, TERMINAL, #18-14 AWG, TAB RB864	NSNR	EA	
176	21719F	LUG, TERMINAL, #8 AWG, TAB STAKON RD 367	NSNR	EA	
175	07504B	LUG, TERMINAL, #20 AWG, TAB RA863	5940-00-557-1629	EA	
174	21955Z	LUG, TERMINAL #10 AWG, 1/4" BOLT, TAB RC10-14	5940-00-866-2586	EA	
173	21720F	LUG, TERMINAL, #22 AWG, TAB STAKON, RA-1123	5940-00-848-8847	EA	
172	10397B	LUG, LOCKTITE, #4 AWG, TAB #31007	5940-00-636-5015	EA	
171	21711H	LUG KIT, #1/0 AWG-350 MCM, LORAIN 4835-527	5180-00-101-3518	EA	
170	21824A	LUG KIT, #4-3/0 AWG, LORAIN 4835-526	5180-00-101-3523	EA	
169	22210A	LUG KIT, #8-2 AWG, LORAIN 4835-524	NSNR	EA	
168	21708F	LUG KIT, #14-4 AWG, LORAIN 4835-523	5180-00-101-3522	EA	
167	21710G	LUG ADAPTER, ANGLE, LORAIN 3627-531	5940-00-101-3498	EA	
166	02622D	LOCKNUT, CONDUIT, 2", TAB #146	5975-00-642-7263	EA	
165	23922H	KEY SWITCH, 3C, LORAIN 2523-314	NSNR	EA	
164	21726B	JUMPER, SQUARE D, TYPE 9080-JCA-6	NSNR	EA	
163	23313D	INSULATING MOUNTING ASSEMBLY 23" X 4", LORAIN 4133-036	NSNR	EA	
ITEM	SML	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					

162	23946Z	HEAT-SHRINK INSULATOR, 500-1,000 MCM, TAB H5500-1,000	NSNR	PKG		
161	21695C	HEAT BAFFLE, 23" x 3-1/2", LORAIN 4133-024	NSNR	EA		
160	21712W	GROUND TERMINAL STRIP, LORAIN 4835-530	5940-00-101-3520	EA		
159	23220J	GROUND BAR, COPPER, 0-700A, 19" MTG, LORAIN 4361-039	NSNR	EA		
158	24892J	GROUND BAR, COPPER, 400A, 19" MTG, LORAIN 4361-038	NSNR	EA		
157	22207W	GROUND BAR, COPPER, 700A, 23" MTG, LORAIN 4361-041	NSNR	EA		
156	21950E	FUSE PANEL BUS BAR, 2 PNLS, LORAIN 3476-102	NSNR	EA		
155	21729E	FUSE BLOCK, 10 POLES, LITTLEFUSE 556010	NSNR	EA		
154	21840E	FUSE LINK, 400A, 250V, LORAIN 2484-651	5920-00-101-3496	EA		
153	21839E	FUSE LINK, 250A, 250V, LORAIN 2484-645	NSNR	EA		
152	21838D	FUSE, LINK, 125A, 250V, LORAIN 2484-635	NSNR	EA		
151	21697E	FUSE, NON-TYPE, 50A, LORAIN 2483-523	NSNR	EA		
150	21698F	FUSE, NON-TYPE, 30A, LORAIN 2483-515	NSNR	EA		
149	18043Q	FUSE, TYPE 70 (INDICATING ALARM) 1-1/3A, LORAIN 2486-208	5920-00-904-2671	EA		
148	24047A	FUSE, 6A, 250V, LORAIN 2483-505	NSNR	EA		
147	24440K	FUSE, SAB, SLO-BLO, 15A, LITTLEFUSE 523015	NSNR	EA		
146	21723W	FUSE, SAB, SLO-BLO, 10A, LITTLEFUSE 523010	NSNR	EA		
145	24439H	FUSE, SAB, SLO-BLO, 5A, LITTLEFUSE 523005	NSNR	EA		
144	24438G	FUSE, SAB, NORMAL, 15A, LITTLEFUSE 514015	NSNR	EA		
143	24437F	FUSE, SAB, NORMAL, 10A, LITTLEFUSE 514010	NSNR	EA		
142	24436E	FUSE, SAB, NORMAL, 8A, LITTLEFUSE 512008	NSNR	EA		
141	21724Z	FUSE, SAB, NORMAL, 5A, LITTLEFUSE 512005	5920-00-280-3469	EA		
140	24435D	FUSE, SAB, NORMAL, 3A, LITTLEFUSE 512003	NSNR	EA		
139	24434C	FUSE, SAB, NORMAL, 2A, LITTLEFUSE 512002	NSNR	EA		
138	24433B	FUSE, SAB, NORMAL, 1A, LITTLEFUSE 512001	NSNR	EA		
137	24449G	FUSE, SAB, 15A, 250 V, LITTLEFUSE 314015	NSNR	EA		
136	24448F	FUSE, SAB, ALARM, 5A, LITTLEFUSE	5920-01-007-5677	EA		
135	24447E	FUSE, SAB, ALARM, 4A, BUSS	5920-00-806-3152	EA		
134	24446D	FUSE, SAB, ALARM, 3A, LITTLEFUSE	5920-00-133-4898	EA		
133	24445C	FUSE, SAB, ALARM, 3A, BUSS	5920-00-503-4843	EA		
132	24444B	FUSE, SAB, ALARM, 2A, LITTLEFUSE	5920-01-007-5676	EA		
131	24443A	FUSE, SAB, ALARM, 2A, BUSS	5920-00-295-7013	EA		
130	24442Z	FUSE, SAB, ALARM, 1A LITTLEFUSE	5920-00-195-2330	EA		
129	24441J	FUSE, SAB, ALARM, 1A, BUSS	5920-00-665-0515	EA		
128	24429H	FUSE, 1/4W WITH 10 OHM RESISTOR, LORAIN 2486-203	NSNR	EA		
127	23988H	FUSE, INDICATING, TYPE 70, 5A	5920-00-538-6205	EA		
126	24428H	FUSE, INDICATING, TYPE 70, 3A	5920-00-284-9218	EA		
125	24427G	FUSE, INDICATING, TYPE 70, 2A	5920-00-284-9217	EA		
124	24426F	FUSE, INDICATING, TYPE 70, 1-1/3A	5920-00-539-6347	EA		
123	24432A	FUSE, GRASSHOPPER, 10A, BURNIDY F1101T5	5920-00-624-2661	EA		
122	24431Z	FUSE, GRASSHOPPER, 7-1/2A, GTE 027087A11	5920-00-857-8418	EA		
121	17237Z	FUSE, GRASSHOPPER, 5A, BUSSMAN 35H	5920-00-122-3775	EA		
120	16432K	FUSE, GRASSHOPPER, 3A, BUSSMAN 35G	5920-00-156-0837	EA		
119	24430J	FUSE, GRASSHOPPER, 2A, BUSSMAN 35L	5920-00-556-9728	EA		
118	1642AE	FUSE, GRASSHOPPER, 1-1/3A, BUSSMAN 35B	5920-00-156-0838	EA		
117	24831D	FUSE, GMT 10, 10A, LORAIN 2486-112	NSNR	EA		
116	17144N	FUSE, GMT 5, 5A	5920-00-857-8417	EA		
115	24425E	FUSE, GMT 3-1/2, 3-1/2A	5920-01-056-7256	EA		
114	16582Y	FUSE, GMT 3, 3A	5920-00-081-5958	EA		
113	24424D	FUSE, GMT 2, 2A	5920-00-857-8933	EA		
112	10333D	FUSE, GMT 1, 1A	5920-00-901-9936	EA		
111	00740C	EXPANSION, SHIELD, 3/8" - 16, MACH BOLT	5340-00-754-4560	EA		
110	21725A	COPPER STRIP, 1/2" W, 5" L, 1/32" THICK	NSNR	EA		
109	24412C	CONNECTOR, TWO-WAY, 4/0 AWG-300 MCM, TAB 32513	5940-00-961-0477	EA		
108	21819G	COMPOUND, SEALING, NONHARDENING PERMAGUM	NSNR	EA		
107	24404F	CAPACITOR FILTER PANEL, 23" x 7", 1AW DMG STD-MS-0003	NSNR	EA		
106	24405G	CAPACITOR FILTER PANEL, 19" x 7", 1AW DMG STD-MS-0003	NSNR	EA		
105	11474A	CABLE, 3-COND STR INS, #16 AWG, BELDEN 9219	6145-00-584-7974	FT		
104	14823F	CABLE, 2-COND STR INS, #16 AWG, BELDEN 8471	6145-00-689-9338	FT		
103	03755D	CABLE, STR INS, 600V, 350 MCM, BLK	6145-00-417-5797	FT		
102	21830F	CABLE, STR INS, 600V, 350 MCM, WHT, ANIXTER 68-3501	NSNR	FT		
101	03499A	CABLE, SINGLE COND, #2 AWG, WHT, STR	6145-00-184-3875	FT		
100	03516B	CABLE, SINGLE COND, #2 AWG, BLK, STR	6145-00-051-9790	FT		
99	20993E	CABLE, 11-PR, #22 AWG, BELDEN 8765	6145-00-081-1049	FT		
98	21717D	CABLE, 3-PR, #22, STR, BELDEN 9745	NSNR	FT		
97	1510AA	CABLE, 1-PR, #20 AWG, STR, INS	6145-00-845-5206	FT		
96	21705C	BUSHING, 2" OD, CHASE NIPPLE, TAB 1947	5975-00-710-0876	EA		
95	21825B	BUS BAR, LORAIN 3425-194	NSNR	EA		
94	24996D	SWITCH, SAFETY 3-POLE, 240V, 100A, Q02000HAS	NSNR	EA		
93		SHUNT AND CONTACTOR PANEL ASSEMBLY E/W SHUNT AND CONTACTOR PANEL, 200A 23" x 3-1/2" LORAIN 4376-017	NSNR	EA		
	24995C	METER SHUNT, 200A, LORAIN 2982-716	6625-01-051-2098	EA		
ITEM	SML	DESCRIPTION	NSN	UI	QTY	ITE
LIST OF MATERIALS						

4

3

2

1

ITEM	SML	DESCRIPTION	NSN	UI	QTY
92	22232A	RECTIFIER-CHARGER, 48-V DC, 200A, 3 #, 380 V AC, 50/60 HZ, LORAIN 44200C50	6130-00-101-3508	EA	
91	24366A	RECTIFIER-CHARGER, 48-V DC, 200A, 3 #, 208 V AC, 60 HZ, LORAIN 44200D50	NSNR	EA	
90	22202D	RACK, 23" X 7", LORAIN 4124-010	5975-00-101-3525	EA	
89	22173C	METER PANEL ASSEMBLY, CONSISTING OF METER PANEL, E/M 75-VOLT DC VOLTMETER LORAIN 4374-061	5805-00-177-2919	EA	
24891K	23201B	AMMETER, 0- TO 200-AMP, LORAIN 2925-775	NSNR	EA	
23201B	23201B	AMMETER SHUNT, 200-AMP, LORAIN 2982-714	NSNR	EA	
88	24890L	METER PANEL ASSEMBLY CONSISTING OF METER PANEL, E/M 75-VOLT DC VOLTMETER LORAIN 4374-061	NSNR	EA	
24891K	23201B	AMMETER, 0- TO 200-AMP, LORAIN 2925-775	NSNR	EA	
23201B	23201B	AMMETER SHUNT, 200-AMP, LORAIN 2982-714	NSNR	EA	
87	22410C	RIT, EMERGENCY BATTERY SAFETY	NSNR	EA	
86	21851E	INVERTER, 500-VA, 48-V DC TO 120-V AC, 1# 60 HZ, LORAIN 44A501B	NSNR	EA	
85	24408Z	INVERTER, 1-KVA, 48-V DC TO 120-V AC, 1# 60 HZ, LORAIN 44A102B	NSNR	EA	
84	24410A	INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1# 50/60 HZ, LORAIN 44A202B	NSNR	EA	
83	24409A	INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1# 60 HZ, LORAIN 44A202B	NSNR	EA	
82	18332N	INVERTER, 5-KVA, 48-V DC TO 120-V AC, 1# 60 HZ, LORAIN 44A502B	NSNR	EA	
81	21689H	FUSE PANEL, ONE 61-400A FUSE POSITION, LORAIN 4314-012	5920-00-177-2738	EA	
80	21691J	FUSE PANEL, SIX 31-60A FUSE POSITIONS, LORAIN 4316-507	NSNR	EA	
79	18825D	FUSE PANEL, SIX 0-30A FUSE POSITIONS, LORAIN 4316-505	NSNR	EA	
78	22114D	FUSE PANEL, THREE 0-30A, THREE 31-60A FUSE POSITIONS, LORAIN 4316-506	NSNR	EA	
77	24418W	FUSE PANEL, (18) 0-5A TYPE 70 FUSES, LORAIN 4317-408	NSNR	EA	
76	21867Z	FUSE PANEL, (22) 0-5A FUSE POSITIONS LORAIN 4318-405	NSNR	EA	
75	18159K	FUSE PANEL, EIGHT 0-30 FUSE POSITIONS LORAIN 4317-008	5920-00-878-4817	EA	
74	24129F	FUSE PANEL, FOUR 0-30A & FOUR 31-60A FUSE POSITIONS, LORAIN 4317-010	NSNR	EA	
73	21942H	FUSE PANEL, (8) 31-60A FUSE POSITIONS LORAIN 4317-009	NSNR	EA	
72	18038K	FUSE PANEL, (2) 61-400A FUSE POSITIONS LORAIN 4316-002	5920-00-878-4805	EA	
71	24401C	FUSE PANEL, FOUR 61-400A FUSE POSITIONS LORAIN 4317-012	5920-00-156-3681	EA	
70	24415F	FILTER, DECENTRALIZING, 50A, LORAIN 4826-065	NSNR	EA	
69	24411B	FILTER, DECENTRALIZING 100A, LORAIN 4826-084	NSNR	EA	
68	22111A	ELECTROLYTE, 15-GAL CONTAINER, 1,400 S.G.	NSNR	EA	
67	22112B	ELECTROLYTE, 5-GAL CONTAINER, 1,400 S.G.	NSNR	EA	
66	18156N	DISCONNECT PANEL, LOW-VOLTAGE, 200A, LORAIN 4863-708	NSNR	EA	
65	24893Z	CIRCUIT BREAKER ENCLOSURE, E/M 2-100A MAIN, 2-15A, 2-10A, AND 26-5A DC BREAKERS, CURTIS 271C7	NSNR	EA	
64	24899G	CEMF CELL PANEL, 3V, 200A, LORAIN 4628-303	NSNR	EA	
63	21786F	CABINET BASE, PAR-METAL CB-1931	NSNR	EA	
62	21661B	CABINET, EQUIPMENT, 19" WIDE, 31" DEEP, 0A" PANEL MOUNTING, PAR-METAL PC-8413	NSNR	EA	
61	24954F	BATTERY RACK, 2-STEP, SEISMIC ZONE 4, RESTRAINTS, EXIDE 83989-108	NSNR	EA	
60	24953E	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84022-108	NSNR	EA	
59	24952D	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84558-108	NSNR	EA	
58	24888F	BATTERY RACK, 2-STEP, SEISMIC ZONE 4 RESTRAINTS, EXIDE 83987-84	NSNR	EA	
57	24887E	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84020-84	NSNR	EA	
56	24886D	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84556-84	NSNR	EA	
55	24948A	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074531-666	NSNR	EA	
54	24947Z	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074531-333	NSNR	EA	
53	24946W	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3 AND 4 RESTRAINTS, GOULD 507-074520-666	NSNR	EA	
52	24945H	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074520-333	NSNR	EA	
51	24881J	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074516-666	NSNR	EA	
50	24880K	BATTERY RACK, 2-STEP, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074516-333	NSNR	EA	
49	24942E	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-14-EPII	NSNR	EA	
48	24941D	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-14-EPI	NSNR	EA	
47	24940C	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-10-EPII	NSNR	EA	
46	24939C	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-10-EPI	NSNR	EA	

LIST OF MATERIALS

REVISION			
ZONE	REV	DESCRIPTION	DATE

45	24496J	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-9-EPII	NSNR	EA
44	24495K	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-9-EPI	NSNR	EA
43	24936Z	BATTERY RACK, 2-STEP, EXIDE 84558-108	NSNR	EA
42	24871Z	BATTERY RACK, 2-STEP, EXIDE 84556-84	NSNR	EA
41	24934H	BATTERY RACK, 2-STEP, GOULD 507-074531	NSNR	EA
40	24933G	BATTERY RACK, 2-STEP, GOULD 507-074520	NSNR	EA
39	24868H	BATTERY RACK, 2-STEP, GOULD 507-074516	NSNR	EA
38	24931E	BATTERY RACK, 2-STEP, C & D RD-903-14	NSNR	EA
37	24930D	BATTERY RACK, 2-STEP, C & D RD-903-10	NSNR	EA
36	24866F	BATTERY RACK, 2-STEP, C & D RD-903-9	NSNR	EA
35	24928C	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84755-108	NSNR	EA
34	24927B	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84788-108	NSNR	EA
33	24926A	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84537-60	NSNR	EA
32	24862B	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84753-84	NSNR	EA
31	24861A	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84786-84	NSNR	EA
30	24471M	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84539-84	NSNR	EA
29	24922G	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074493-666	NSNR	EA
28	24921F	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074493-333	NSNR	EA
27	24920E	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074482-666	NSNR	EA
26	24919E	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 RESTRAINTS, GOULD 507-074482-333	NSNR	EA
25	24918D	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074478-666	NSNR	EA
24	24854E	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS GOULD 507-074478-333	NSNR	EA
23	24916B	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-14-EPII	NSNR	EA
22	24915A	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-14-EPI	NSNR	EA
21	24914Z	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-10-EPII	NSNR	EA
20	24913W	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-10-EPI	NSNR	EA
19	24481N	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-9-EPII	NSNR	EA
18	24480Y	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-9-EPI	NSNR	EA
17	24910F	BATTERY RACK, 2-TIER, EXIDE 84537-60	NSNR	EA
16	24847V	BATTERY RACK, 2-TIER, EXIDE 84539-84	NSNR	EA
15	24908E	BATTERY RACK, 2-TIER, GOULD 507-074493	NSNR	EA
14	24907D	BATTERY RACK, 2-TIER, GOULD 507-074482	NSNR	EA
13	24844F	BATTERY RACK, 2-TIER, GOULD 507-074478	NSNR	EA
12	24905B	BATTERY RACK, 2-TIER, C & D RD-901-14	NSNR	EA
11	24904A	BATTERY RACK, 2-TIER, C & D RD-901-10	NSNR	EA
10	18132P	BATTERY RACK, 2-TIER, C & D RD-901-9	NSNR	EA
9	24902N	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1,800 AH, EXIDE 26C-23	NSNR	EA
8	24901H	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 2,016 AH, GOULD NCK-2016	NSNR	EA
7	24900G	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 2,016 AH, C & D LCT-2016	NSNR	EA
6	24899F	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1,260 AH, EXIDE 26C-15	NSNR	EA
5	24898E	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1,344 AH, GOULD NCK-1344	NSNR	EA
4	24897D	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 1,344 AH, C & D LCT-1344	NSNR	EA
3	24896C	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 860 AH, EXIDE 26C-9	NSNR	EA
2	24895B	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 750 AH, GOULD NCK-750	NSNR	EA
1	24894A	BATTERY BANK, LEAD/CALCIUM-ACID, 24-CELL, 840 AH, C & D LCT-840	NSNR	EA

ITEM		SML	DESCRIPTION	NSN	UI	QTY
<div> <div> IDENT NO STD-MS-0020 SHEET 1 OF 25 </div> <div> ORGANIZATION US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY </div> </div> <div> DESIGN BY S. FENSEL DATE APR 79 </div> <div> DRAWN BY S. D. H. DATE APR 79 </div> <div> CHECKED BY F. MYERS DATE APR 79 </div> <div> APPROVAL <i>[Signature]</i> PROJECT </div> <div> ACTIVITY CCC-CEB-SEP </div> <div> SIZE D </div> <div> PDSH NO 50470 </div> <div> DRAWING NO </div> <div> SCALE NONE </div> <div> SHEET 1 OF </div>						

4

3

2

1

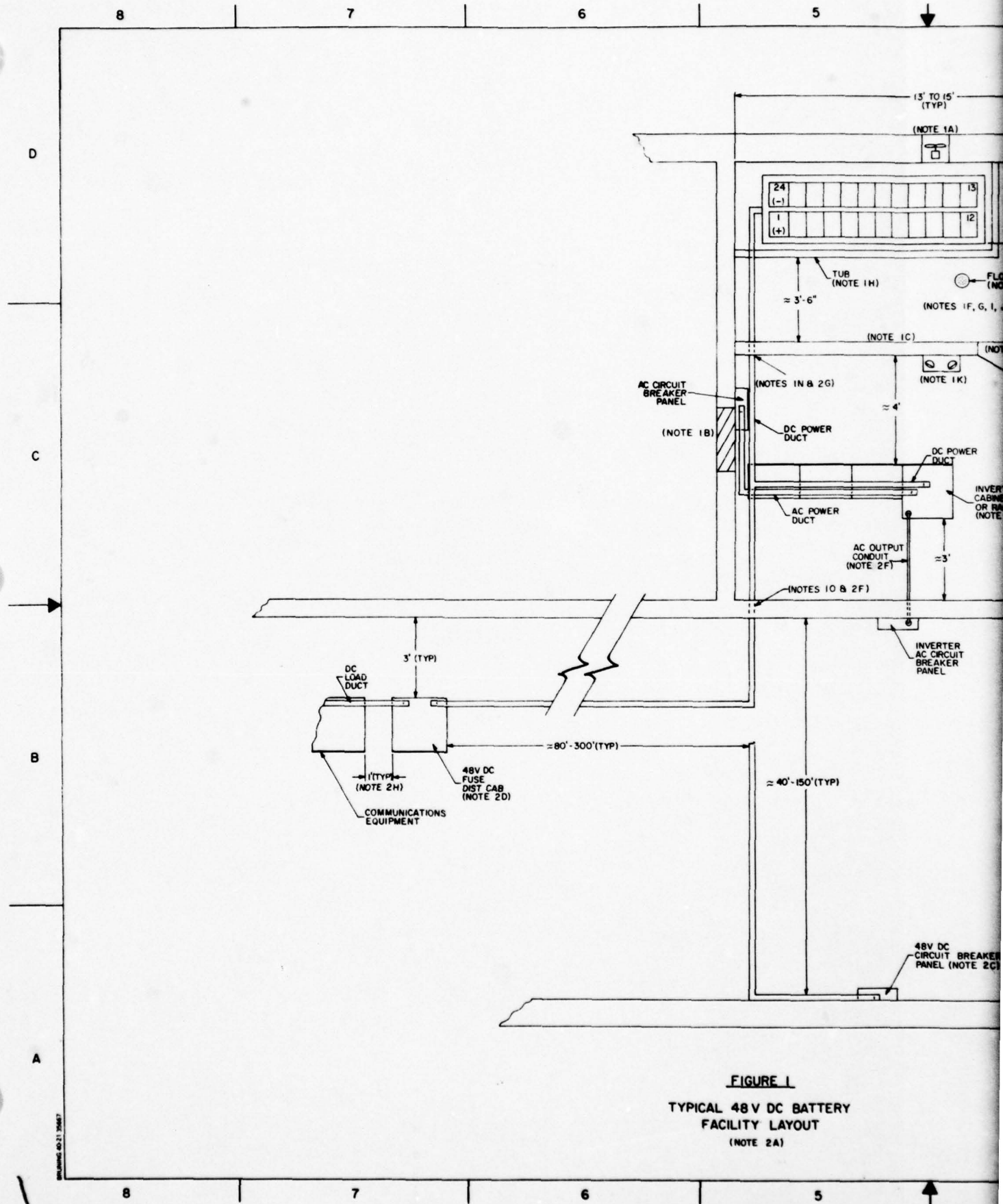
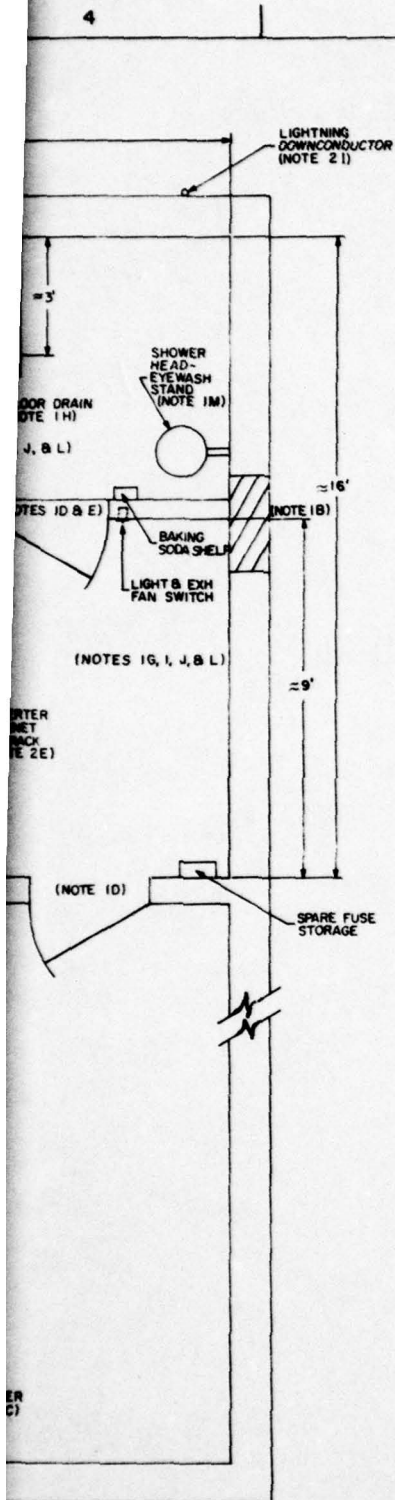


FIGURE 1
TYPICAL 48V DC BATTERY
FACILITY LAYOUT
 (NOTE 2A)



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

1. FACILITY ENGINEER NOTES:

- PROVIDE AND INSTALL A 400- TO 800-CFM, ELECTRIC, SPARK-PROOF EXHAUST FAN IN THE BATTERY ROOM WITH ON/OFF SWITCH LOCATED OUTSIDE NEAR THE BATTERY ROOM ENTRANCE DOOR.
- WALL IN UNNECESSARY DOOR, WINDOW, OR OTHER OPENINGS WITH MASONRY.
- ERECT A PERMANENT PARTITION OR WALL FROM FLOOR TO CEILING.
- PROVIDE AND INSTALL AN ENTRANCE DOOR - 3'-3" WIDE AND 6'-3" HIGH WITH LOCKING DEVICE ON THE DC EQUIPMENT ROOM DOOR.
- PROVIDE A 1" OR HIGHER DOOR SILL TO CONTAIN LIQUIDS WITHIN THE BATTERY ROOM.
- REMOVE ANY EXISTING NORMAL LIGHTING FIXTURES, SWITCHES, ELECTRICAL OUTLETS, AND UNUSED ELECTRICAL WIRING IN THE PROPOSED BATTERY ROOM.
- REMOVE ANY UNNECESSARY HEATERS AND PLUMBING.
- IF A FLOOR DRAIN IS USED IN THE BATTERY ROOM, PROVIDE A LEVEL AREA (+1/8") FOR THE BATTERY BANK. SLOPE THE REMAINING FLOOR AREA TO THE DRAIN. THE DRAIN SHOULD BE ROUTED TO AN ACID CATCH BASIN WHERE ACID CAN BE NEUTRALIZED AND DRAINED OR PUMPED INTO THE SEWER NETWORK IN CASE OF LARGE SPILLS. IF A DRAIN CANNOT BE USED, AN ACID-PROOF TUB (CONCRETE OR OTHER) MUST BE PROVIDED UNDER THE BATTERY RACK TO CONTAIN POTENTIAL SPILLS. (SEE SHEET 4, TABLE 3, FOR BATTERY RACK DIMENSIONS.)
- PATCH ANY HOLES AND PAINT THE TUB, WALLS (TO A HEIGHT OF 5'), AND FLOOR WITH AN ACID-RESISTANT COATING. PAINT THE REMAINING WALL AND CEILING TO MATCH THE OTHER AREAS. PATCH AND PAINT THE DC EQUIPMENT ROOM TO MATCH.
- PROVIDE AND INSTALL SPARK-PROOF LIGHTING FIXTURES IN THE BATTERY ROOM WITH THE ON/OFF SWITCH LOCATED OUTSIDE THE BATTERY ROOM DOOR. MINIMUM ILLUMINATION SHOULD BE 30 FOOT-CANDLES 3 FEET ABOVE THE FLOOR. PROVIDE AND INSTALL FLUORESCENT LIGHT FIXTURES IN THE DC EQUIPMENT ROOM. REQUIRED ILLUMINATION IS - 50 FOOT-CANDLES 3 FEET ABOVE THE FLOOR.
- PROVIDE AND INSTALL AUTOMATIC EMERGENCY LIGHTING TO ILLUMINATE THE DC EQUIPMENT RACK FRONTS AND DOOR DURING AC POWER FAILURES.
- PROVIDE LONG-TERM ENVIRONMENTAL CONTROL TO KEEP THE BATTERY AND DC EQUIPMENT ROOMS BETWEEN 60°F (15.6°C) AND 85°F (29.4°C) AND A RELATIVE HUMIDITY RANGE OF 20 TO 80 PERCENT. OCCASIONAL TEMPERATURE AND HUMIDITY VARIATIONS ABOVE AND BELOW THE ABOVE LIMITS ARE PERMISSIBLE.
- PROVIDE AND INSTALL A COLD WATER DELUGE SHOWER HEAD AND EYEWASH STAND.
- PROVIDE AN OPENING FOR THE DC POWER DUCT BETWEEN THE DC EQUIPMENT AND BATTERY ROOMS.
- PROVIDE OPENINGS IN THE CEILING/WALL FOR THE AC AND DC POWER DUCTS BETWEEN THE DC POWER AND COMMUNICATIONS EQUIPMENT.

2. COMMUNICATIONS ENGINEER NOTES:

- THIS LAYOUT IS TYPICAL FOR A BATTERY FACILITY LOCATION ON THE SAME FLOOR WITH THE COMMUNICATIONS EQUIPMENT.
- FOR RELATIVELY SHORT DISTANCES TO THE COMMUNICATIONS EQUIPMENT (-75'), LOCAL DISTRIBUTION IN THE DC EQUIPMENT ROOM CAN BE USED; SHEET 3 AND 16.
- FOR LONGER DISTANCES OR SEPARATE LOCATIONS AND MODERATE DISTRIBUTION REQUIREMENTS, THE WALL-MOUNTED CIRCUIT BREAKER ARRANGEMENT IS RECOMMENDED, ESPECIALLY IF FLOOR SPACE IS MINIMUM; SEE SHEETS 8 AND 17. SEVERAL PANELS CAN BE USED, LOCATED NEAR THE LOADS.
- THE SEPARATE FUSE DISTRIBUTION CABINET IS RECOMMENDED FOR LARGE DISTRIBUTION REQUIREMENTS IN SEPARATE LOCATIONS, OVER 80 FEET AWAY. THE DISTRIBUTION CABINET SHOULD BE PLACED NEAR THE COMMUNICATIONS EQUIPMENT TO MINIMIZE WIRE LENGTHS. SEE SHEETS 5 AND 18.
- AN INVERTER FROM 0.5 TO 5 KVA CAN BE INSTALLED TO PROVIDE 120-V AC, 1 ϕ , 50/60 HZ POWER FOR CRITICAL AC-POWERED EQUIPMENT.
- THE DUCTS BETWEEN THE BATTERY FACILITY AND COMMUNICATIONS EQUIPMENT SHOULD CONTAIN AN INSULATING COUPLING NEAR THE PENETRATIONS IN THE DC EQUIPMENT ROOM TO PREVENT ELECTRICAL NOISE FROM THE DC POWER RACKS FROM BEING CONDUCTED TO THE COMMUNICATIONS EQUIPMENT ALONG THE METAL DUCTS.
- AFTER ALL CABLES ARE INSTALLED, SEAL THE INSIDE OF THE DC DUCT AT THE PENETRATION BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS WITH NONHARDENING SEALER TO PREVENT CONDUCTION OF GASES TO THE DC EQUIPMENT RACKS.
- IF THE DC DISTRIBUTION CABINET CONTAINS DC-TO-DC CONVERTERS, AN INVERTER, OR OTHER ELECTRICALLY NOISY EQUIPMENT, SEPARATE THE CABINET FROM THE COMMUNICATIONS EQUIPMENT AS SHOWN, AND INSULATE THE OUTPUT (LOAD) DUCT AT THE CABINET TO PREVENT CONDUCTION OF NOISE TO THE COMMUNICATIONS EQUIPMENT. IF THIS CABINET CONTAINS AN AC OUTLET, USE NONMETALLIC CONDUIT FOR CONNECTION TO THE AC POWER DUCT.
- GROUND THE BATTERY RACK ONLY IF LOCATED WITHIN 6 FEET OF A LIGHTNING DOWN-CONDUCTOR.

PROJECT NO.	STD-MS-0020
SHEET	2 OF 25
DRAWN BY	L. H. LEE
APPROVED	<i>Hm Saba</i>

SIZE	TECH NO.
D	50470
SCALE	NONE

DRAWING NO.	
SHEET	OF

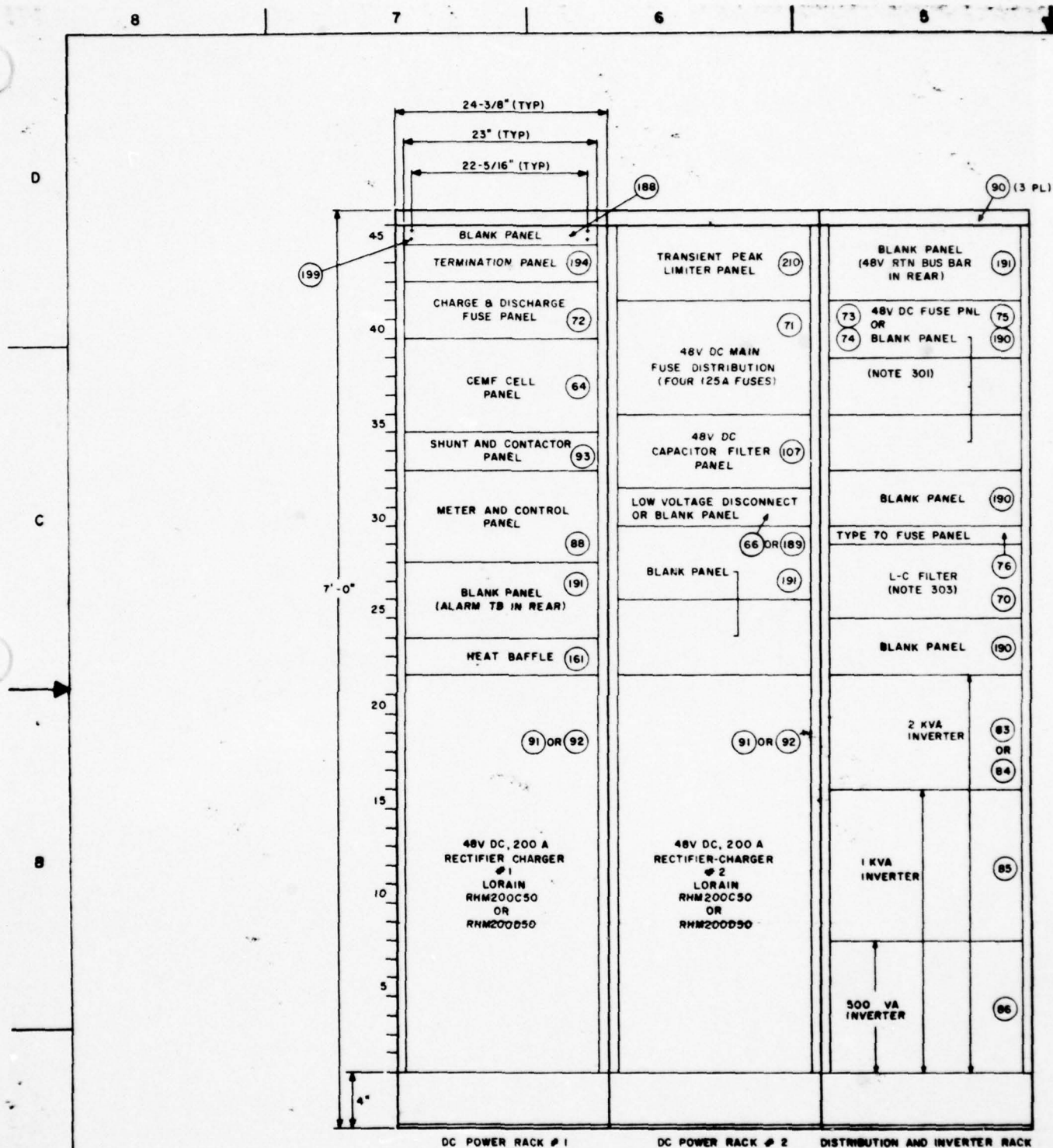


FIGURE 2
DC POWER EQUIPMENT RACK FACE LAYOUT
 (NOTE 301)

REVISION		
ZONE	REV	DATE

1. GENERAL ENGINEER NOTES:

- A. THE RACK LINEUP SHOULD BE OPTIMIZED FOR THE PARTICULAR APPLICATION. RACKS SHOULD BE EASILY ACCESSIBLE FOR MAINTENANCE. RACKS SHOULD ALSO BE PLACED FOR MINIMUM AVERAGE CABLE LENGTHS TO ALL CONNECTED EQUIPMENT.
- B. SPACE IS REQUIRED IN BACK OF ALL EQUIPMENT RACKS. MINIMUM CLEARANCE IS 24 INCHES. DESIRABLE DISTANCE IS 36 INCHES OR GREATER.
- C. ONE SIDE OF THE EQUIPMENT LINEUP CAN BE PLACED AGAINST A WALL OR OTHER EQUIPMENT. IF PLACED AGAINST A WALL, ALLOW A MINIMUM OF 4 INCHES OF CLEARANCE.

2. GENERAL INSTALLER NOTES:

- A. RECTIFIER-CHARGER AND CONTROL RACK INSTALLATION STEPS.
 - (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
 - (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE MARKING LINES AND LOCATION POINTS.
 - (3) DETERMINE FLOOR POSITION AND BOLT THE RECTIFIER-CHARGER AND CONTROL RACKS TO THE FLOOR.
 - (4) BOLT THE RACKS TOGETHER NEAR THE TOP.
 - (5) INSTALL THE RECTIFIER-CHARGERS IN RACKS 1 AND 2.
 - (6) ASSEMBLE THE DISTRIBUTION RACK.
 - (7) INSTALL THE AC AND DC POWER DUCTS OVER THE RACKS AND INTO THE BATTERY ROOM.
 - (8) INSTALL DC POWER CABLES UP TO THE BATTERY TERMINALS, BUT DO NOT CONNECT TO THE BATTERY AT THIS TIME. (TAPE THE ENDS OF THE CABLES TO PREVENT ACCIDENTAL CONTACT.)
 - (9) INSTALL AC AND REMAINING DC POWER CABLES.
 - (10) COMPLETE WIRING OF THE RECTIFIER-CHARGER AND CONTROL RACKS.
 - (11) AFTER ALL CABLES ARE INSTALLED, PROVIDE A DIVIDER INSIDE THE DUCT WHERE IT CROSSES BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS.
- B. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH SECTION 7 OF THIS SEIP.

NOTE:

301. SELECT THE APPROPRIATE FUSE PANELS FOR LOCAL DISTRIBUTION. SEE SHEET 16. COVER UNUSED BACK SPACE WITH BLACK PANELS. REFER TO SHEETS 8 AND 17 FOR THE WALL-MOUNTED CIRCUIT BREAKER PANEL DISTRIBUTION. SHOWN ON SHEETS 10 AND 18 IS THE REMOTE CABINET DISTRIBUTION ARRANGEMENT.
302. SUITABLE ALTERNATE INVERTERS ARE LAUNCHER AS1-800-40V (800 VA), AS1-1K-40V (1 KVA), AND AS1-2K-40V (2 KVA).
303. A 50A L-C FILTER IS USED FOR THE 1- AND 2-KVA INVERTERS. A 100A L-C FILTER IS USED WITH A 6-KVA INVERTER.

TABLE 1
LORAIN INVERTER CHARACTERISTICS (NOTE 302)

	500 VA	1 KVA	2 KVA	2 KVA
LORAIN MODEL NUMBER	WAA501B	WAA102B	WAA202B	XMBG202B1
INPUT VOLTAGE, VOLTS DC	42-56	42-56	42-56	42-56
NO LOAD CURRENT, AMPS DC	3.1	6.1	11.5	10.2
FULL LOAD CURRENT, AMPS DC	13.6	26.2	51.0	52.0
OUTPUT VOLTAGE, VOLTS AC	120	120	120	120
FREQUENCY, Hz	60	60	60	50/60
EFFICIENCY, PERCENT	70	70	75	75
HEIGHT, IN	12-7/32	26-1/4	37-3/16	37-3/16
WIDTH, IN	7 9	23	23	20-13/16
DEPTH, IN	13	15	15	15
WEIGHT, LB	115	220	350	335
MOUNTING	RACK	RACK	RACK	FLOOR

STD-M9-0020

D 50470

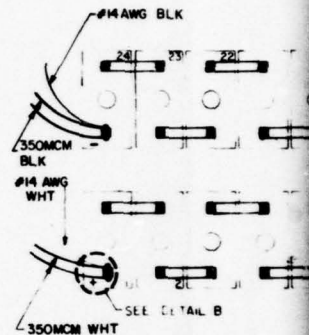
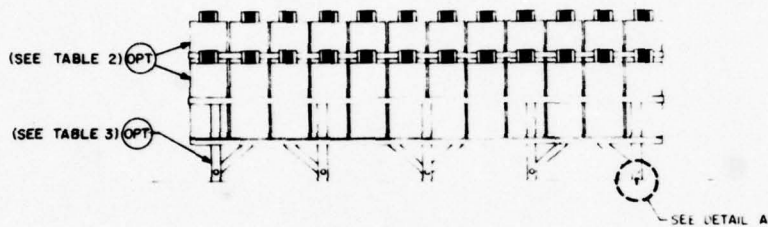


FIGURE 3
TYPICAL BATTERY & RACK INSTALLATION

TYPICAL BATTERY BANK DETAIL

TABLE 2
BATTERY CAPACITY AND CELL TYPE

REQUIRED FULL LOAD BATTERY POWER, HOURS	REQUIRED AMPERE- HOURS	CELL TYPE (NOTE 10)		
		C&D	GOULD	EXIDE
1	200 @ 1-HR RATE	LCT-840	NCX-750	2GC-9
4	800 @ 4-HR RATE	LCT-1344	NCX-1344	2GC-15
8	1600 @ 8-HR RATE	LCT-2016	NCX-2016	2GC-23

TABLE 3
BATTERY BANK DATA

MAKE	BATTERY CELL	TWO-STEP RACK							TWO-TIER RACK							CONTAINERS OF ELECTROLYTE		DIFFUSER VENT NO.
		BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS			BASIC NUMBER	SEISMIC ZONES (NOTE 1A)			DIMENSIONS			15 GAL	5 GAL	
			1	2	3&4	L	M	H		1	2	3&4	L	M	H			
C&D	LCT-840	RD-903-9	-EP1	-EP1	-EP11	9'	30"	29.69"	RD-901-9	-EP1	-EP1	-EP11	9'	20.31"	42.69"	10	2	PV-223
	LCT-1344	RD-903-10	-EP1	-EP1	-EP11	10'	30"	29.69"	RD-901-10	-EP1	-EP1	-EP11	10'	20.31"	42.69"	11	2	PV-223
	LCT-2016	RD-903-14	-EP1	-EP1	-EP11	14'	30"	29.69"	RD-901-14	-EP1	-EP1	-EP11	14'	20.31"	42.69"	16	1	PV-223
GOULD	NCX-750	507-074516	-333	-666	-666	8'	30.75"	23.75"	507-074478	-333	-666	-666	8'	19.75"	41.25"	9	-	RD3-104881
	NCX-1344	507-074520	-333	-666	-666	10'	30.75"	23.75"	507-074482	-333	-666	-666	10'	19.75"	41.25"	11	-	RD3-104870
	NCX-2016	507-074531	-333	-666	-666	15.5'	30.75"	23.75"	507-074493	-333	-666	-666	15.5'	19.75"	41.25"	19	2	RD3-104870
EXIDE			1	2&3	4					1	2&3	4						
	2GC-9	84556-84	84556-84	84020-84	83987-84	7'	42"	22.81"	84539-84	84539-84	84785-84	84753-84	7'	22"	54.69"	11	-	83440
	2GC-15	84556-84	84556-84	84020-84	83987-84	7'	42"	22.81"	84539-84	84539-84	84785-84	84753-84	7'	22"	54.69"	9	-	83440
	2GC-23	84556-108	84556-108	84022-108	83989-108	9'	42"	22.81"	84537-84	84537-84	84788-108	84788-108	5'	22"	54.69"	11	1	83440

REVISION			
ZONE	REV	DESCRIPTION	DATE

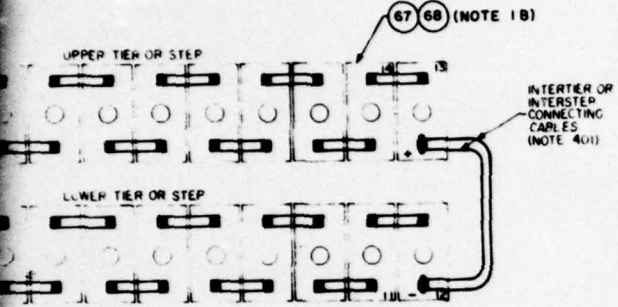
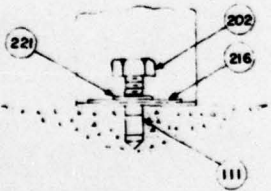
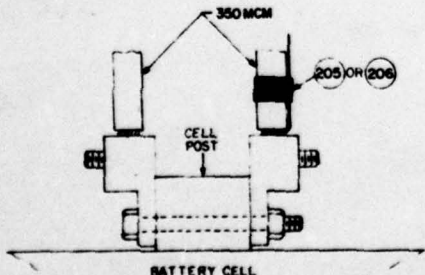


FIGURE 4
BATTERY INTERCONNECTION DIAGRAM



DETAIL A

BATTERY RACK TO CONCRETE FLOOR MOUNTING



DETAIL B

**BATTERY POST CONNECTOR
INSTALLATION**

1. GENERAL ENGINEER NOTES:

- A. TWO-STEP BATTERY RACK PERMITS EASIER MAINTENANCE BUT REQUIRES GREATER DEPTH. WHERE THE BATTERY ROOM IS NARROW, A TWO-TIER RACK MAY BE PREFERRED. SEE TABLE 2 FOR BATTERY RACK DIMENSIONS. REFER TO DRAWING STD-MS-0020 TO DETERMINE SHOCK PROTECTION REQUIREMENTS FOR BATTERY RACKS. ADD SUFFIXES SHOWN IN THE SEISMIC ZONE COLUMNS TO THE BASIC RACK NUMBER FOR C & D AND EXIDE RACKS. ORDER RACK NUMBERS SHOWN IN SEISMIC ZONE COLUMN FOR EXIDE RACKS. (NOTE THAT EXIDE BATTERY RACKS FOR ZONES 2 & 3 ARE IN COLUMN 2. ZONE 4 RACKS ARE IN COLUMN 3.)
- B. FOR CORUS INSTALLATION, CELLS SHOULD BE SHIPPED NET, FILLED WITH THE PROPER ELECTROLYTE FROM THE MANUFACTURER'S PLANT. FOR OVERSEAS SHIPMENT, CELLS SHOULD BE SHIPPED DRY-CHARGED, TO BE FILLED WITH ELECTROLYTE AFTER INSTALLATION.
- C. ALL CELLS SHOULD BE EQUIPPED WITH DIFFUSER VENTS. ORDER THEM SEPARATELY IF NOT FURNISHED AS PART OF EACH CELL. SEE TABLE 3.
- D. BASED ON A MINIMUM BATTERY TERMINAL VOLTAGE OF 45.5 V (44.0 MIN FOR EQUIP AND 1.5 TOTAL LINE DROP).
- E. ORDER THE FOUR 350 MCM LEAD-PLATED COPPER TERMINAL LUGS AS PART OF THE BATTERY PACKAGE.
- F. BATTERY RACK DIMENSIONS ARE WITHOUT SEISMIC BRACING. ALLOW APPROXIMATELY 2" ADDITIONAL WIDTH FOR TWO-TIER AND 10" ADDITIONAL WIDTH FOR TWO-STEP RACKS WITH SEISMIC BRACING. (NOTE THAT THE LENGTH OF SOME EXIDE RACKS IS INCREASED FOR SEISMIC ZONES 2, 3, AND 4. THE RACK LENGTH IS PROVIDED, IN INCHES FOLLOWING THE PART NUMBER AND DASH.)

2. GENERAL INSTALLER NOTES:

A. BATTERY BANK INSTALLATION STEPS:

- (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
 - (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
 - (3) ASSEMBLE THE BATTERY RACK AND ANCHOR TO THE FLOOR. THE FLOOR SPACE FOR THE BATTERY BANK SHOULD BE LEVEL. IF THIS IS NOT THE CASE, USE STEEL FLAT WASHERS UNDER THE BATTERY RACK LEGS TO LEVEL THE BATTERY RACK PRIOR TO INSTALLING THE CELLS.
 - (4) BEFORE PROCEEDING WITH THE UNPACKING, HANDLING, INSTALLATION, AND OPERATION OF THE LEAD-ACID CELLS, REVIEW THE SAFETY PRECAUTIONS LISTED IN THE MANUFACTURER'S MANUAL.
 - (5) EXAMINE ALL CELLS FOR CONCEALED DAMAGE.
 - (6) PLACE CELLS ON BATTERY RACK AND INSTALL CELL TERMINAL HARDWARE.
 - (7) ELECTROLYTE IS SHIPPED IN CONCENTRATED FORM AND MUST BE DILUTED WITH DISTILLED WATER PRIOR TO USE IN THE CELLS. USE OF CONCENTRATED (HIGH SPECIFIC GRAVITY) ACID WILL DAMAGE THE CELL. INITIAL FILLING OF CELLS SHALL BE DONE WITH ELECTROLYTE HAVING A SPECIFIC GRAVITY BETWEEN 1.200 AND 1.280.
 - (8) PRIOR TO REMOVING BATTERY CAPS, PREPARE ENOUGH ELECTROLYTE TO FILL SEVERAL CELLS. SINCE ADDITION OF CONCENTRATED SULFURIC ACID TO WATER GENERATES HEAT, THE ELECTROLYTE MUST BE PREPARED IN ADVANCE TO ALLOW TIME FOR COOLING. THE ELECTROLYTE SHOULD NOT BE HOTTER THAN ROOM WHEN POURED INTO THE CELLS.
- CAUTION:** ALWAYS POUR ACID INTO WATER—NEVER WATER INTO ACID. POUR ACID SLOWLY, SINCE FAST POURING WILL GENERATE ENOUGH HEAT TO CAUSE FLASHING, BOILING, AND BURNING. WEAR RUBBER GLOVES, RUBBER APRON, AND GOGGLES WHILE PREPARING ELECTROLYTE AND FILLING CELLS.
- (9) AFTER UNPACKING THE DIFFUSER VENT CAPS AND PREPARING CELLS FOR RECEIPT OF ELECTROLYTE, FILL THE CELLS WITH ELECTROLYTE TO THE MARKER LEVEL SHOWN ON THE PLASTIC JANS. (THIS WILL ALLOW SOME SPACE FOR SLIGHT ADJUSTMENTS IN SPECIFIC GRAVITY LATER.)
 - (10) CHECK THE SPECIFIC GRAVITY AT ROOM TEMPERATURE AND ADJUST TO 1.205 IF NECESSARY.

B. INSTALLERS MUST TAKE SPECIAL CARE NOT TO CUT OR ABRADE THE DC CABLE INSULATION DURING INSTALLATION IN THE DUCTS BETWEEN THE BATTERY BANK AND DC EQUIPMENT RACKS.

NOTES:

401. THE INTERCONNECTING CABLES AND INTERCELL STRAPS ARE PART OF THE BATTERY INTERCONNECTION KIT.
402. TO PREVENT DAMAGE TO THE BATTERY CELL POSTS, INSTALL THE 350 MCM CABLES SO THAT THEIR HEIGHT WILL BE SUPPORTED BY THE CABLE DUCT OR LUGS. IN ADDITION, FORM THE CABLES SO THAT THERE IS NO SIGNIFICANT STRESS IN ANY DIRECTION ON THE POSTS.

STD-MS-0020		SIZE	50470	REVISION NO.
SHEET 4 OF 40		D		
DRAWN BY: L. H. LEE		SCALE	NONE	CHECKED BY:
APPROVED: [Signature]				

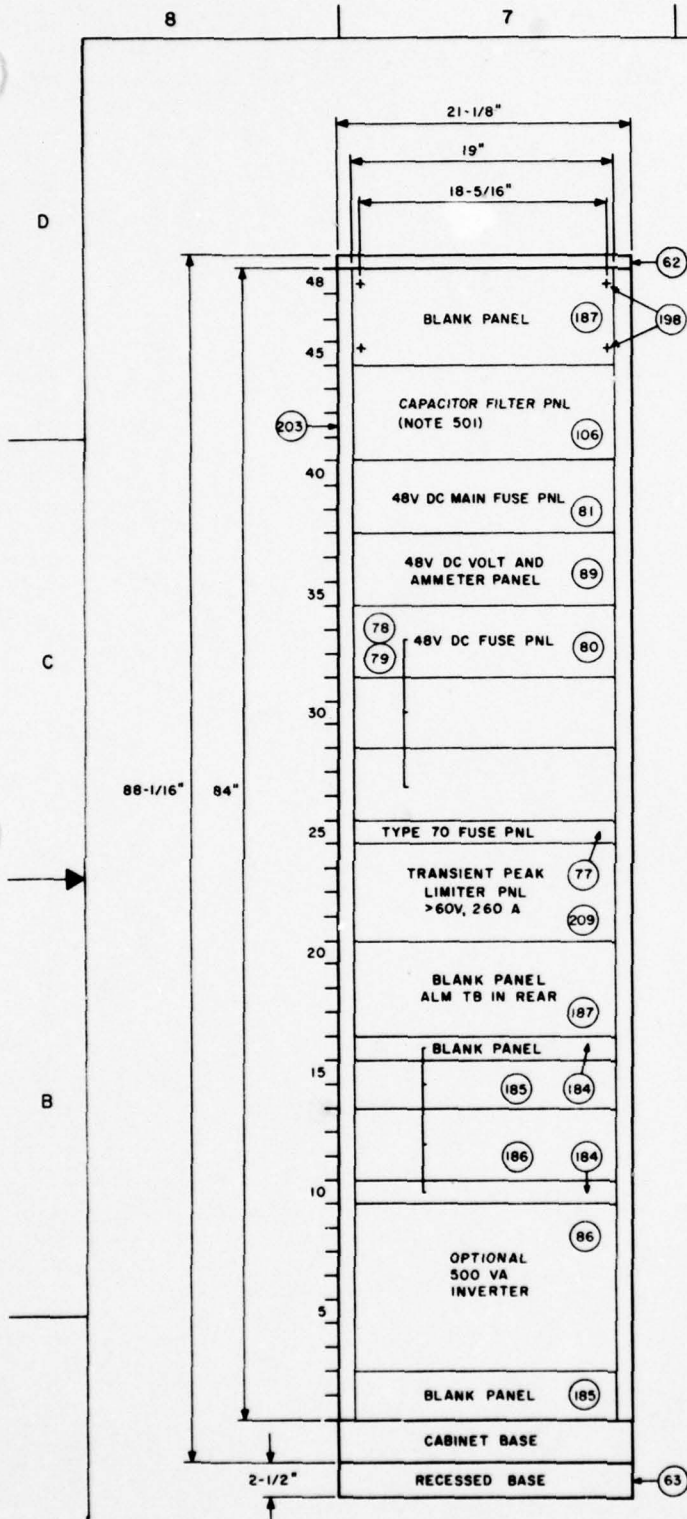


FIGURE 5
TYPICAL 48V DC REMOTE DISTRIBUTION
CABINET FACE LAYOUT

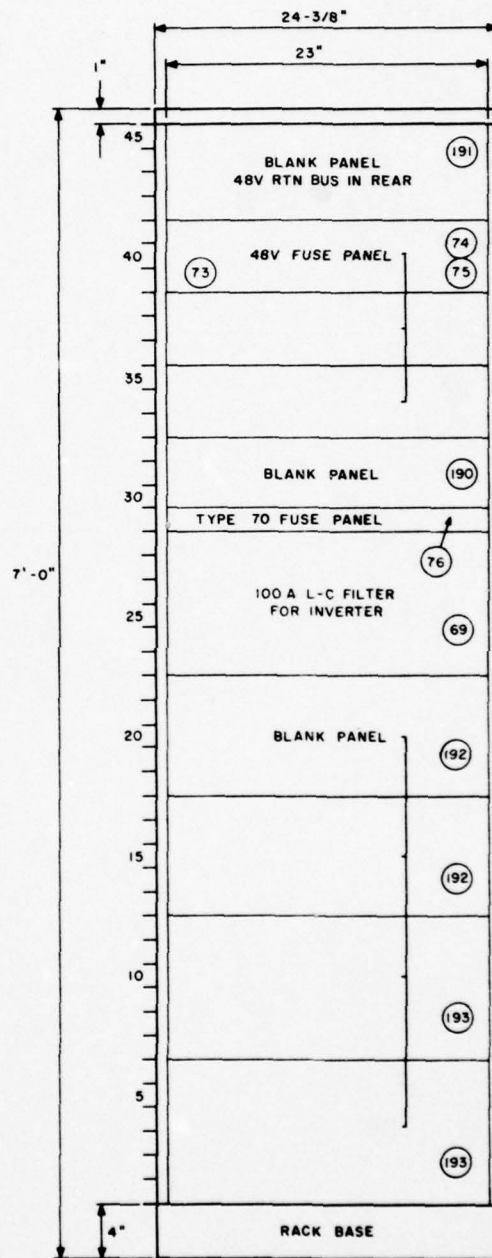


FIGURE 6
AUXILIARY DISTRIBUTION AND FILTER RACK
(NOTES 501 & 502)

5-KVA

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

D

GENERAL NOTES:

1. SEE SHEET 2 FOR RACK AND CABINET FLOOR POSITIONS.
2. DETERMINE CABINET BOLT-DOWN REQUIREMENTS ON A SITE-BY-SITE BASIS.

NOTES:

501. THE AUXILIARY DISTRIBUTION AND FILTER RACK WILL ONLY BE USED WITH THE 5KVA INVERTER AND WILL REPLACE THE DISTRIBUTION AND INVERTER RACK SHOWN ON SHT 3, FIG 2.
502. THE AUXILIARY DISTRIBUTION AND FILTER RACK WILL ONLY BE USED WITH THE 5-KVA INVERTER AND WILL REPLACE THE DISTRIBUTION AND INVERTER RACK SHOWN ON SHEET 3, FIGURE 2.
503. ORDER ONLY FOR 60 HZ SUPPLY LINES.
504. SUITABLE ALTERNATE INVERTER IS LAMARCHE A-51-SK-48V.

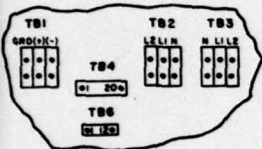
C

B

A

24"

82



(REAR VIEW)

5 KVA, 1 Ø, 60 HZ
INVERTER
LORAIN WAQ 502B
WITH
TYPE #1 TRANSFER
CIRCUIT 4845-389
FREQ METER 4373-215
LINE SYNCH 4872-229
(NOTE 503)

INPUT: 42-56V DC
20 A NO LOAD
124 A FULL LOAD

OUTPUT: 120/240V AC
1 Ø, 60 HZ
80% EFFICIENCY

WEIGHT: 1000 LBS

DEPTH: 27"

(NOTE 504)

FIGURE 7

VA INVERTER RACK FACE LAYOUT

IDENT NO STD-MS-0020		SHEET 5 OF 25		SHEET SPEC NO D 50470		DRAWING NO	
DRAWN BY S. D. H.		SCALE NONE		SHEET		OF	
APPROVED <i>[Signature]</i>							

4

2

3

2

1

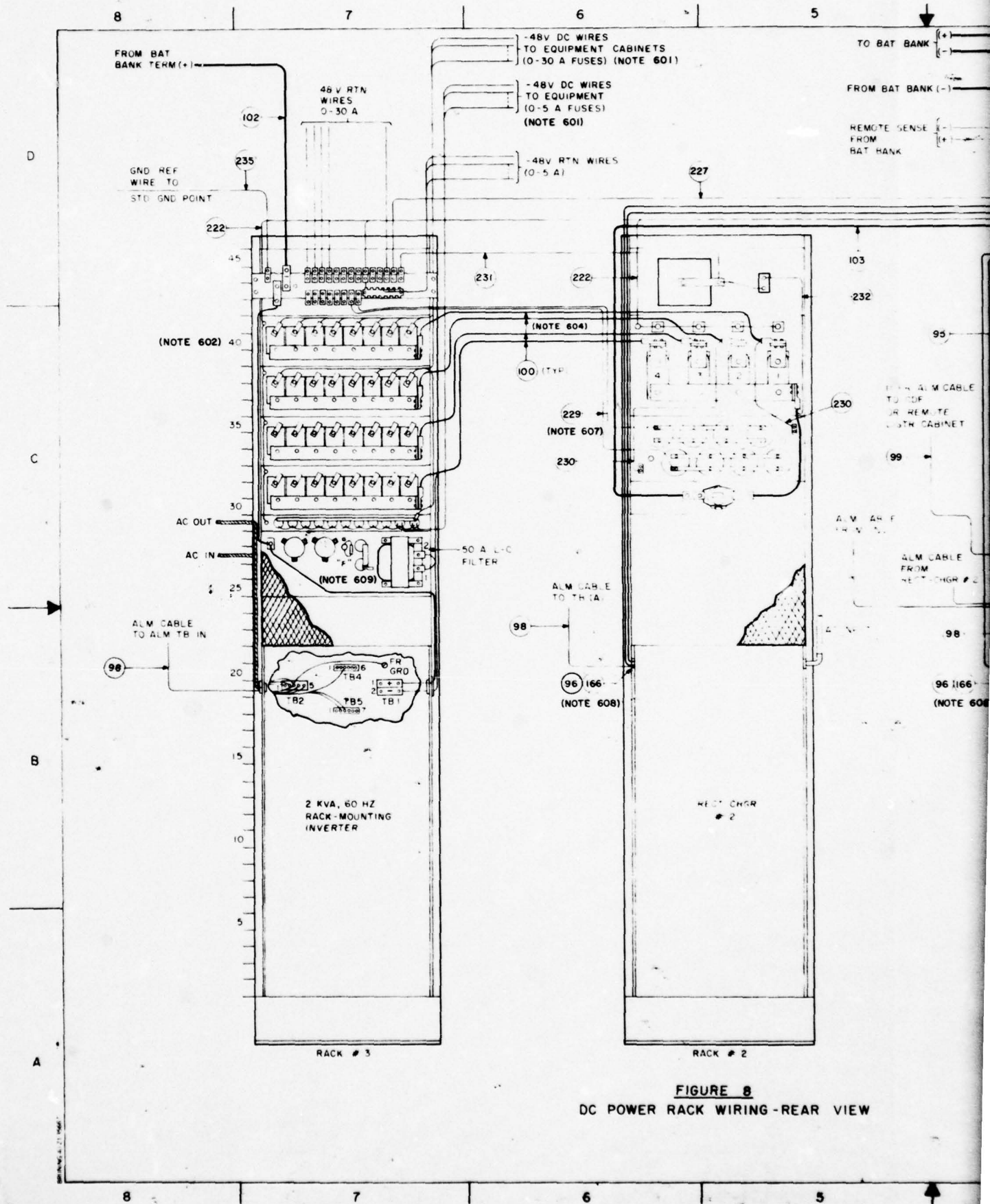
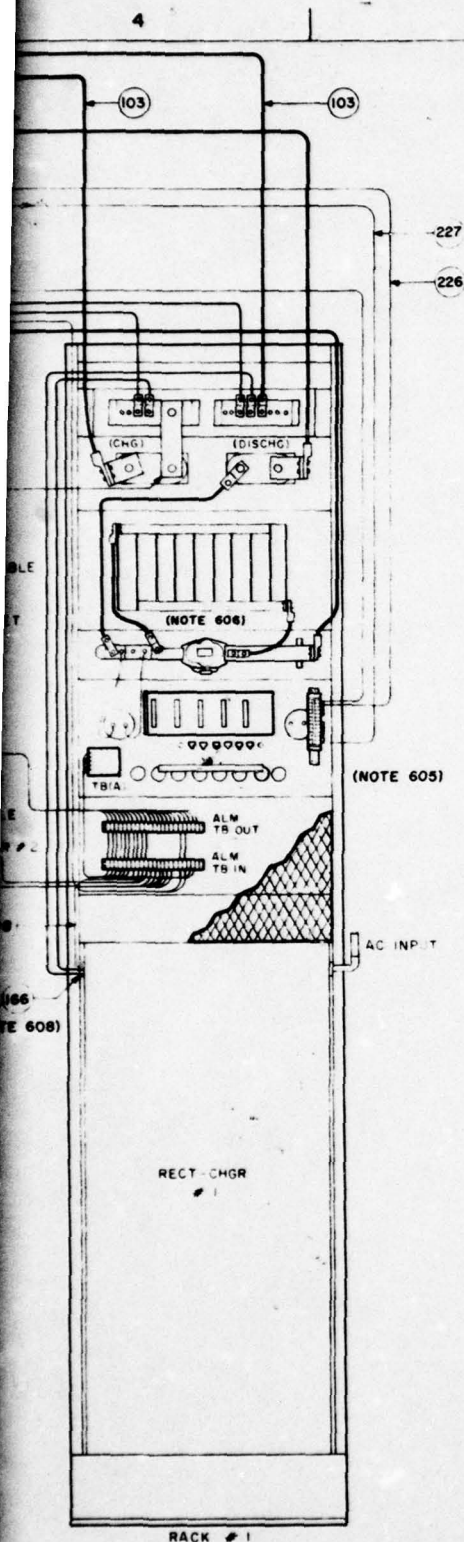


FIGURE 8
DC POWER RACK WIRING-REAR VIEW



REVISION			
NO.	DATE	DESCRIPTION	APPROVED

NOTES:

601. LOAD DISTRIBUTION WIRE SIZES MUST BE CHOSEN BY LOAD CURRENT AND LOOP DISTANCE.
602. FUSE PANELS ARE INSTALLED AND WIRED WHEN LOCAL DISTRIBUTION IS USED. INSTALL AND WIRE PANELS TO MEET SITE REQUIREMENT.
603. OBSERVE MINIMUM BENDING RADIUS FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.
604. INSTALL NUMBER AND SIZE OF CABLES TO DISTRIBUTION PANELS IN RACK #3, WALL MOUNTED DISTRIBUTION PANEL, OR DC DISTRIBUTION CABINET IN EQUIPMENT ROOM TO LIMIT VOLTAGE DROP TO ACCEPTABLE LEVEL.
605. THE METER AND CONTROL PANEL IS SUPPLIED AND WIRED BY THE MANUFACTURER. ADDITIONAL INSTALLER WIRING IS SHOWN IN FIGURE 35, SHEET 22.
606. FORM THE CABLE TO RELIEVE THE STRESS ON THE METER SHUNT.
607. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
608. PUNCH OUT THE 2-INCH KNOCKOUT IN THE COVER PLATE AND INSTALL THE BUSHING WITH LOCKNUT.
609. FOR 48V OPERATION REMOVE THE JUMPER WIRE ACROSS RESISTOR "F".

STD-MS-0020		SHEET 6 OF 25	
REV. NO.	50470	DATE	NOV 68
BY	SDH	SCALE	AS SHOWN
APPROVED		SHEET 6 OF 25	

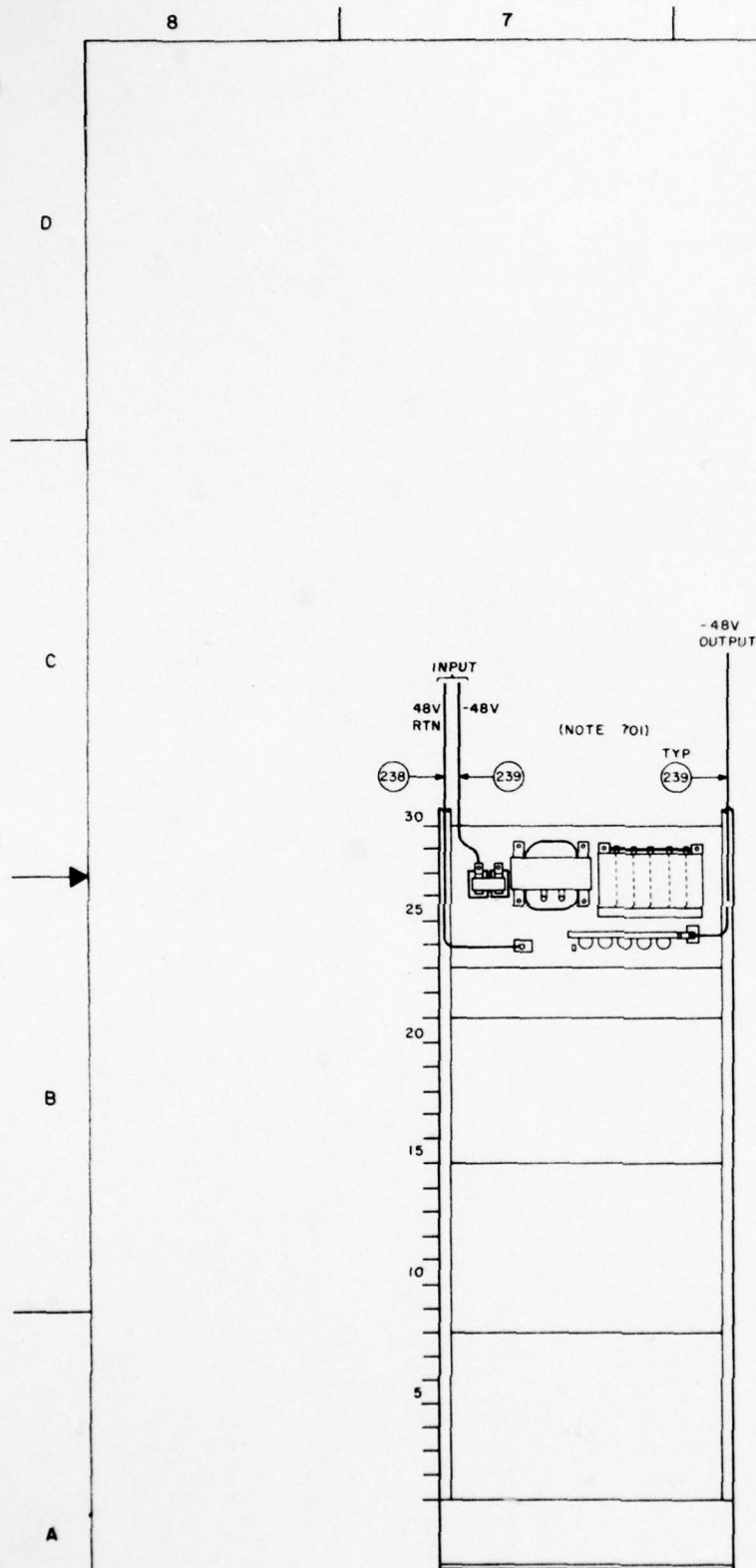


FIGURE 9
AUXILIARY DISTRIBUTION & FILTER RACK
WIRING - PARTIAL REAR VIEW

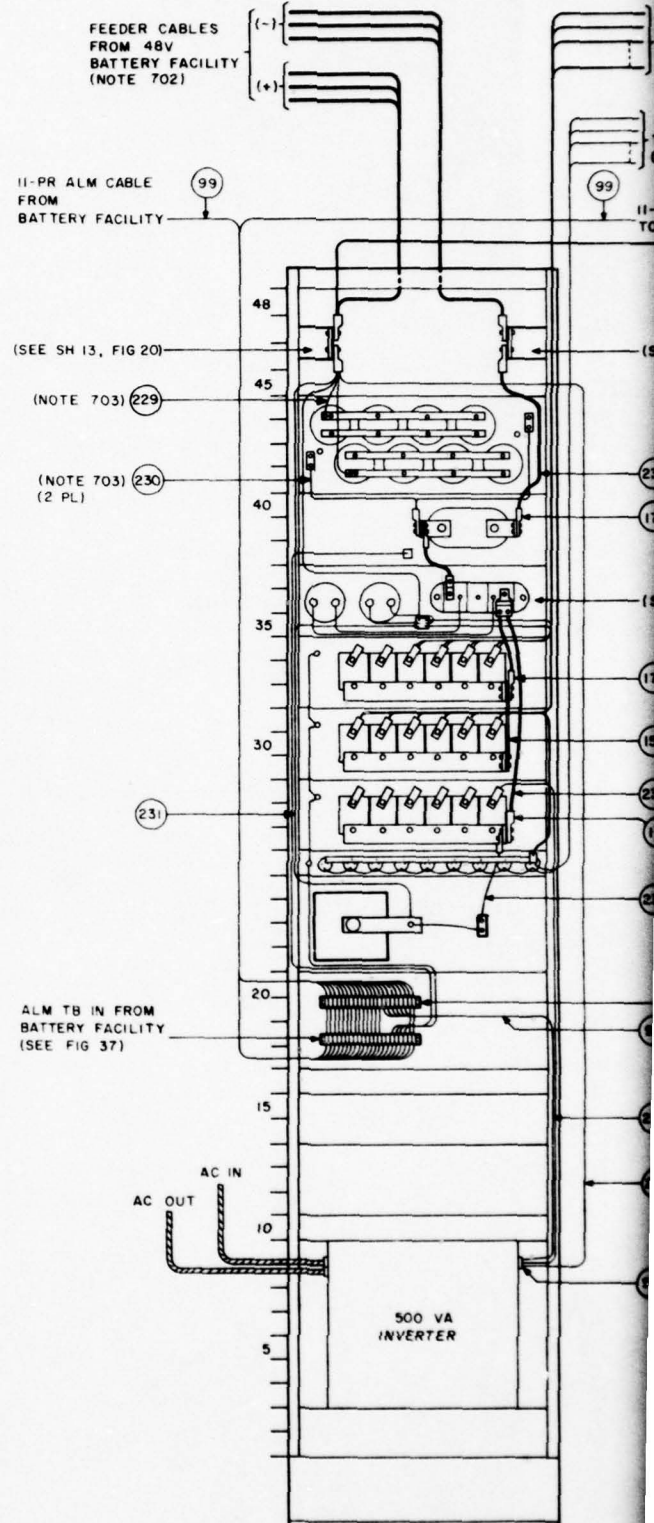


FIGURE 10
48V DC REMOTE DISTRIBUTION CABINET
WIRING - REAR VIEW

4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

-48V WIRES
TO EQUIPMENT
CABINETS
(0-30 A FUSES)

-48V WIRES
TO EQUIP
(0-5 A FUSES)

11-PR ALM CABLES
TO CDF

48V RTN WIRES
(0-30 & 0-5 A FUSES)

NOTES:

701. REAR VIEW WIRING DETAILS FOR TOP HALF OF THIS RACK IS AS SHOWN FOR THE DISTRIBUTION AND INVERTER RACK ON SHEET 6, FIGURE 8.
702. INSTALL NUMBER AND SIZE OF CABLES TO LIMIT VOLTAGE DROP TO 1 VOLT.
703. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
704. OBSERVE MINIMUM BENDING RADI FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.

(SEE SH 12, FIG 19)

(237)

(171) (3 PL)

(SEE SH 12, FIG 18)

(171) (NOTE 704)

(156)

(237)

(171)

(232)

ALM TB OUT
(TO CDF)
(SEE FIG 37)

(98)

(232)

(231)

(96) (66)

D

C

B

A

CABINET

TEST NO. STD-MS-0020	SHEET FROM NO. D 50470	DRAWING NO.
DRAWN BY S.D.H.	SCALE NONE	SHEET OF
APPROVED <i>H. J. Sch...</i>		

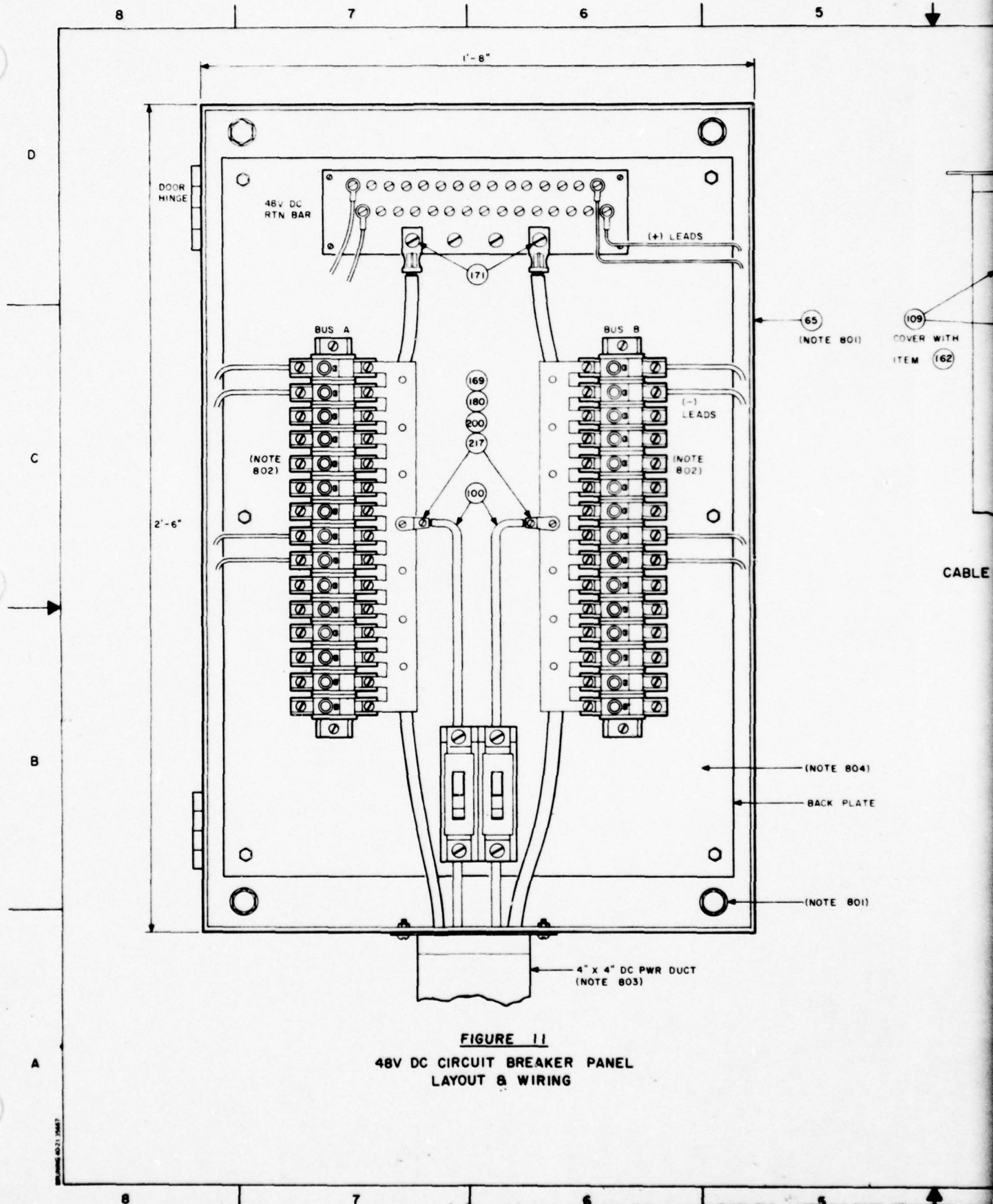
4

2

3

2

1



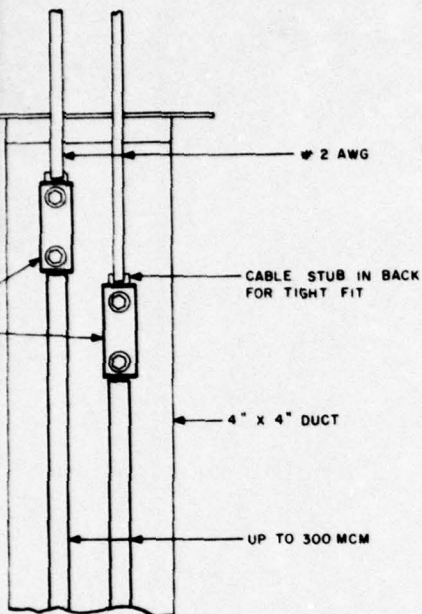
4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES:

801. MOUNT THE CIRCUIT BREAKER PANEL ON WALL OF THE COMMUNICATIONS ROOM, NEAR THE EQUIPMENT SERVED. MOUNTING HARDWARE TO BE SPECIFIED IN SITE EIP.
802. SPECIFY THE REQUIRED BREAKER SIZES.
803. THE DC POWER DUCT NETWORK INSTALLATION DETAILS ARE PART OF EACH EIP.
804. THE CB PANEL IS SHOWN WITH OPEN DOOR AND COVER REMOVED.

D

C

B

A

DETAIL C

CABLE SIZE REDUCING METHOD

STD-MS-0020

SHEET 8 OF 25

DESIGN BY S.D.H.

APPROVED *H.M. Schen*

SIZE PCD NO

D 50470

SCALE NONE

DRAWING NO

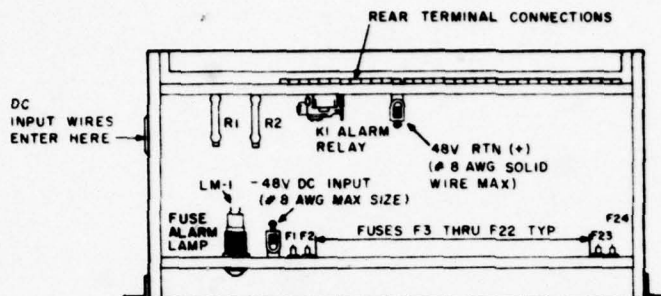
SHEET OF

2

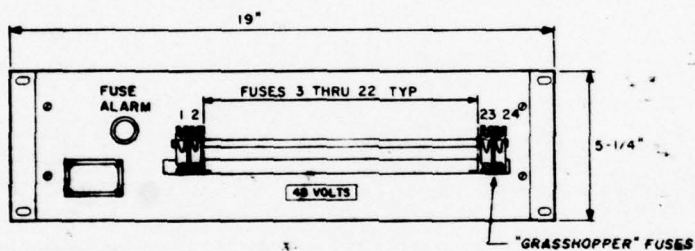
3

2

1



TOP VIEW



FRONT VIEW

FIGURE 12
SB-1523/FT FUSE PANEL LAYOUT

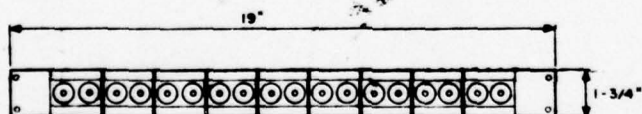


FIGURE 13
LORAIN TYPE 70 O-5A FUSE PANEL

TABLE 4
TYPE 70 FUSE DISTRIBUTION DATA TABLE

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PER COLOR	NSN OR FORD'S DO.	TYPE
1			1-1/2	18 TO 14	WHITE	9820-00-639-6300	70
2			2	18 TO 12	ORANGE	9820-00-639-6300	70
3			3	18 TO 10	BLUE	9820-00-639-6300	70
4			5	14 TO 8	GREEN	9820-00-639-6300	70
5							
6							
7							

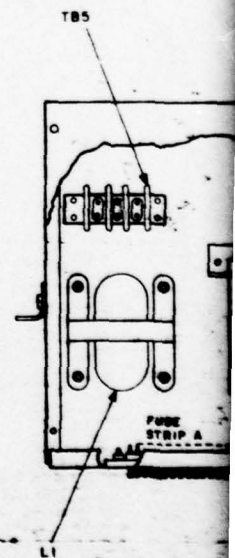
* SELECT THE WIRE SIZE BASED ON A MAXIMUM CURRENT OF 100% OF THE FUSE RATING.

FUSE	EQUIPMENT	APPR LOAD ADC
1		
2		
3		
4		
5		
6		
7		

* SELECT THE WIRE SIZE BASED ON A MAXIMUM

FUSE	EQUIPMENT	APPR LOAD ADC
1		
2		
3		
4		
5		
6		

*SELECT THE WIRE SIZE BASED ON A MAXIMUM



FUSE
FEEL

TABLE 5
"GAASHIPP" FUSE DISTRIBUTION DATA TABLE

APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	BODY COLOR	NSN	TYPE
	1-1/3	18 TO 14	WHITE	5920-00-156-0830	35B
	2	18 TO 12	ORANGE	5920-00-556-8720	35L
	3	14 TO 10	BLUE	5920-00-156-0837	35G
	5	14 TO 8	GREEN	5920-00-122-3775	35H
	7.5	12 TO 6		5920-00-857-0410	GTE D27007A11
	10	12 TO 6		5920-00-624-2661	BURNDY FIL0115

IN A MAXIMUM VOLTAGE DROP FOR THE LOOP OF 0.35-V DC.

TABLE 6
GHT FUSE DISTRIBUTION DATA TABLE

APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN	TYPE
	1	18 TO 14	GRAY	5920-00-901-9936	GHT 1
	2	18 TO 12	ORANGE	5920-00-857-8933	GHT 2
	3	14 TO 10	BLUE	5920-00-081-5958	GHT 3
	3.5	14 TO 10		5920-01-056-7256	GHT 1-1/2
	5	14 TO 8	GREEN	5920-00-857-0417	GHT 5
	10	12 TO 6	RED/WHITE	NSN	GHT 10

IN A MAXIMUM VOLTAGE DROP FOR THE LOOP OF 0.35-V DC.

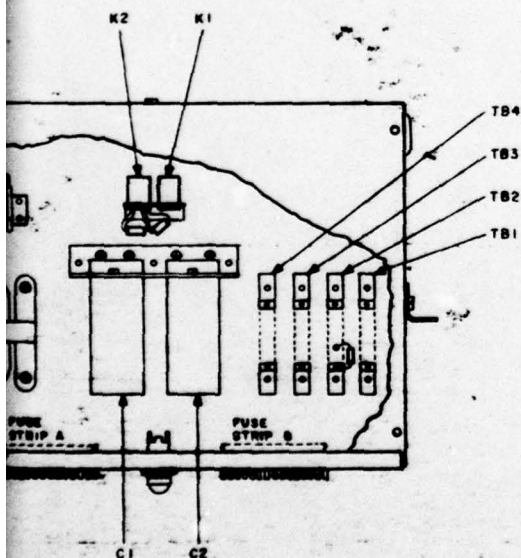


FIGURE 1
FUSE PANEL (G-5000/PTC
(FALCON, 1000 FUSES))

STD-MS-0080
S. O. H.

SIZE 1500
D 50470
BONE

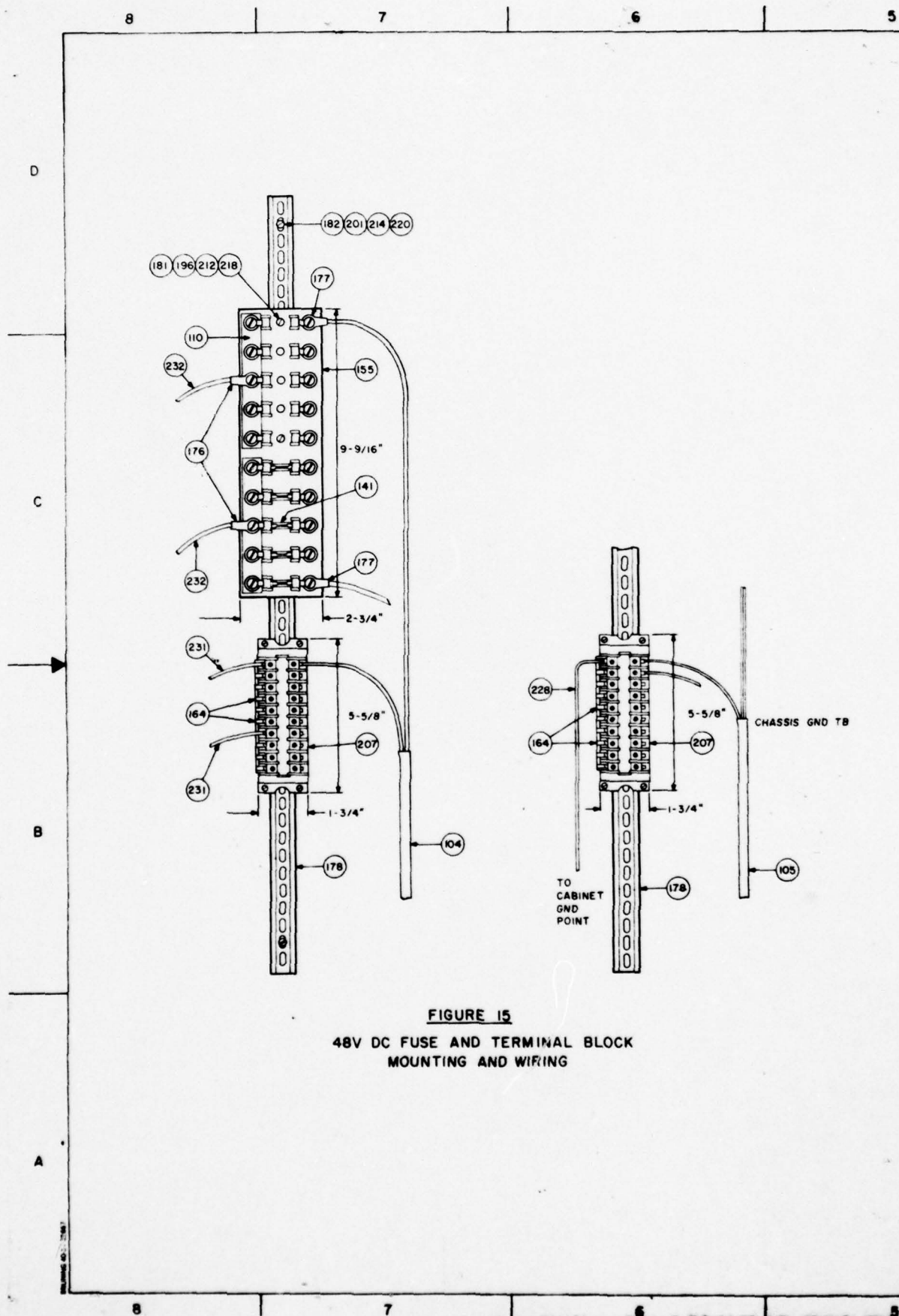


FIGURE 15

48V DC FUSE AND TERMINAL BLOCK
MOUNTING AND WIRING

FUSE NO.	RATING A	WIRE SIZE, AWG
1	1 NORMAL	18
2	2 NORMAL	18
3	3 NORMAL	18
4	5 NORMAL	16
5	8 NORMAL	14
6	10 NORMAL	14
7	15 NORMAL	12
8	5 SLO-BLO	16
9	10 SLO-BLO	14
10	15 SLO-BLO	12

(NOTE 1003)

FUSE NO	RATING A	WIRE SIZE AWG (NOTE 1003)
1	1	#18
2	2	#18 TO 14
3	3	#18 TO 14
4	4	#16 TO 12
5	5	#16 TO 12
6		
7		

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

TABLE 7

CABINET FUSE ASSIGNMENTS				CAB#
EQUIP	MAX LOAD, A (TYPICAL)	FUSE TYPE	MFGR'S NO.	
	0.5	5 AG	LITTLEFUSE 512001	
	1.1	5 AG	LITTLEFUSE 512002	
	2.0	5 AG	LITTLEFUSE 512003	
	2.8	5 AG	LITTLEFUSE 512005	
	6	5 AG	LITTLEFUSE 514008	
	7	5 AB	LITTLEFUSE 514010	
	9	5 AB	LITTLEFUSE 514015	
	3.2	5 AB	LITTLEFUSE 523005	
	7.5	5 AB	LITTLEFUSE 523010	
	10.5	5 AB	LITTLEFUSE 523015	
(1003)	TOTAL			

NOTES:

1001. MOUNT THE FUSE AND TERMINAL BLOCK ASSEMBLIES ON THE LEFT SIDE OF CABINET (FACING REAR).
1002. IF THE EQUIPMENT REQUIRES A CHASSIS GROUND CONNECTION, A GROUNDING BLOCK CAN BE ADDED ON THE CHANNEL BELOW THE 48-V RTN (+) BLOCK. A 3-CONDUCTOR POWER CORD IS REQUIRED, CONNECTED AS SHOWN.
1003. SELECT THE WIRE SIZE BASED ON A MAXIMUM DROP FOR THE LOOP OF 0.35V DC.

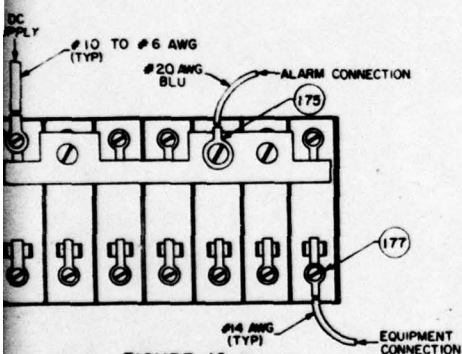


FIGURE 16

BUSS FUSE TERMINAL BLOCK

TABLE 8

BUSS FUSE BLOCK FUSE ASSIGNMENTS				
EQUIP	MAX LOAD, A (TYPICAL)	FUSE TYPE	NSN	MFGR
	0.5		5920-00-665-0515 5920-00-195-2330	BUSS LITTLEFUSE
	1.1		5920-00-295-7013 5920-01-007-5676	BUSS LITTLEFUSE
	1.9		5920-00-503-4843 5920-00-133-4898	BUSS LITTLEFUSE
	2.6		5920-00-806-3152	BUSS
	3.5		5920-01-007-5677	LITTLEFUSE

STD-MS-0020

SHEET 10 OF 23

DRAWN BY S.D.H.

APPROVED H.M. Schaefer

SIZE: FROM NO.

D 50470

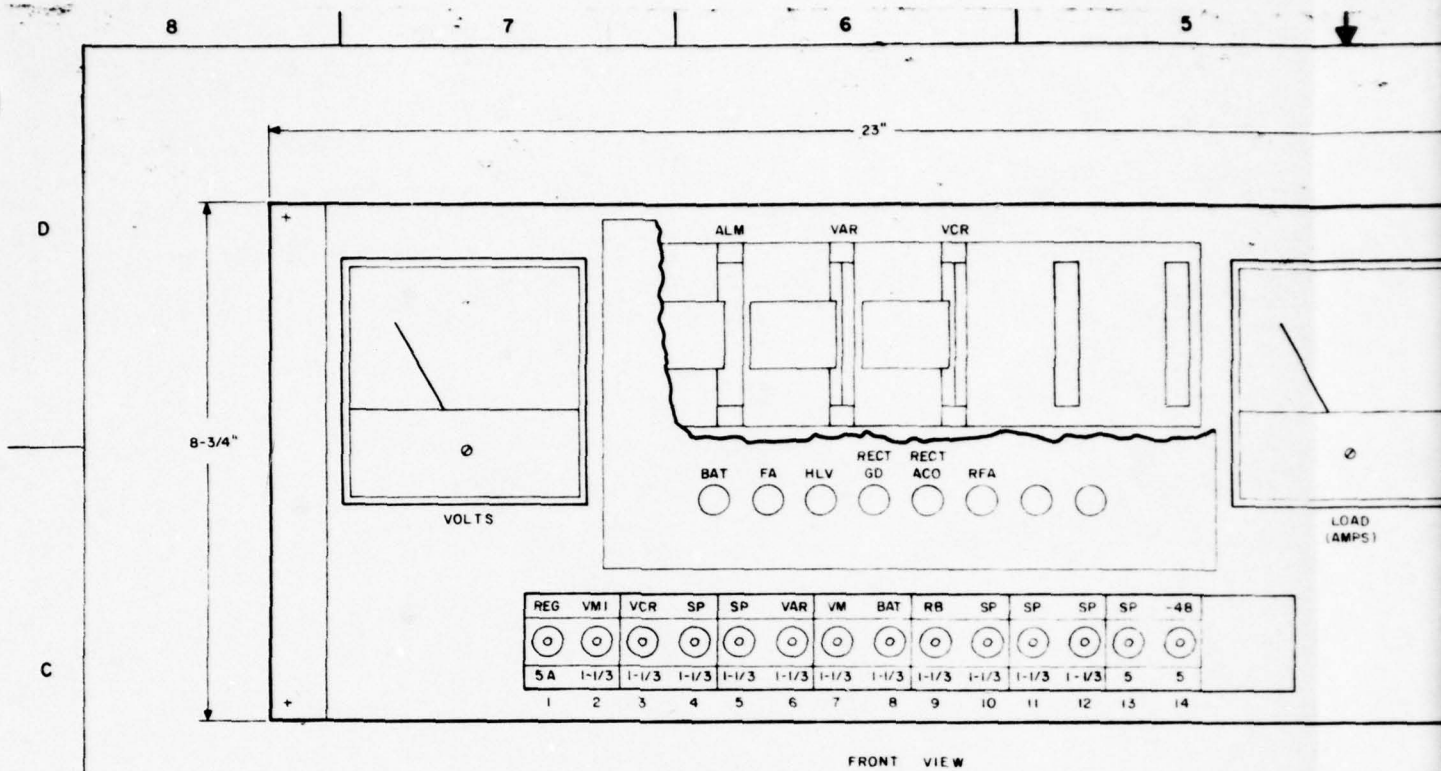
SCALE: NONE

DRAWING NO.

SHEET

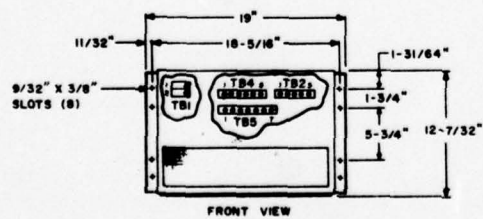
OF

2



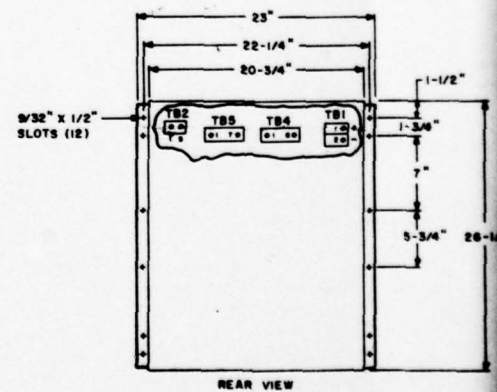
FRONT VIEW

FIGURE 17
METER & CONTROL PANEL LAYOUT



DETAIL D

500VA, 60 HZ INVERTER DIMENSIONS
& LOCATION OF TERMINAL BOARDS



DETAIL E

1 KVA, 60 HZ INVERTER DIMENSIONS
& LOCATION OF TERMINAL BOARDS

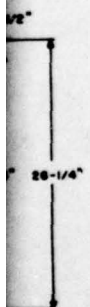
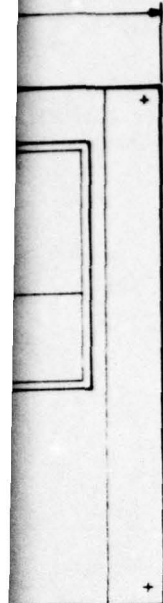
4 3 2 1

REVISION			
ZONE	REV	DESCRIPTION	DATE

D

C

A



ONS
SS

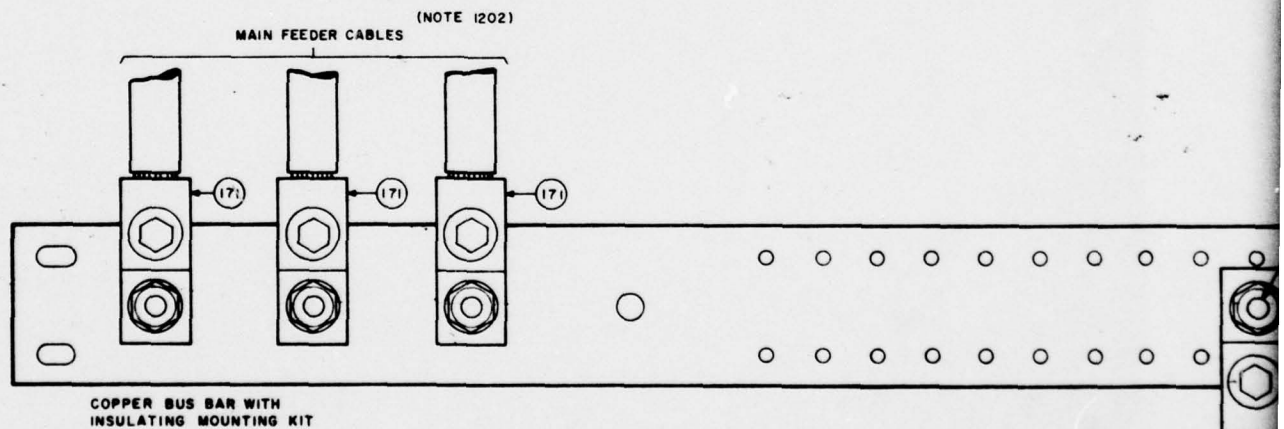
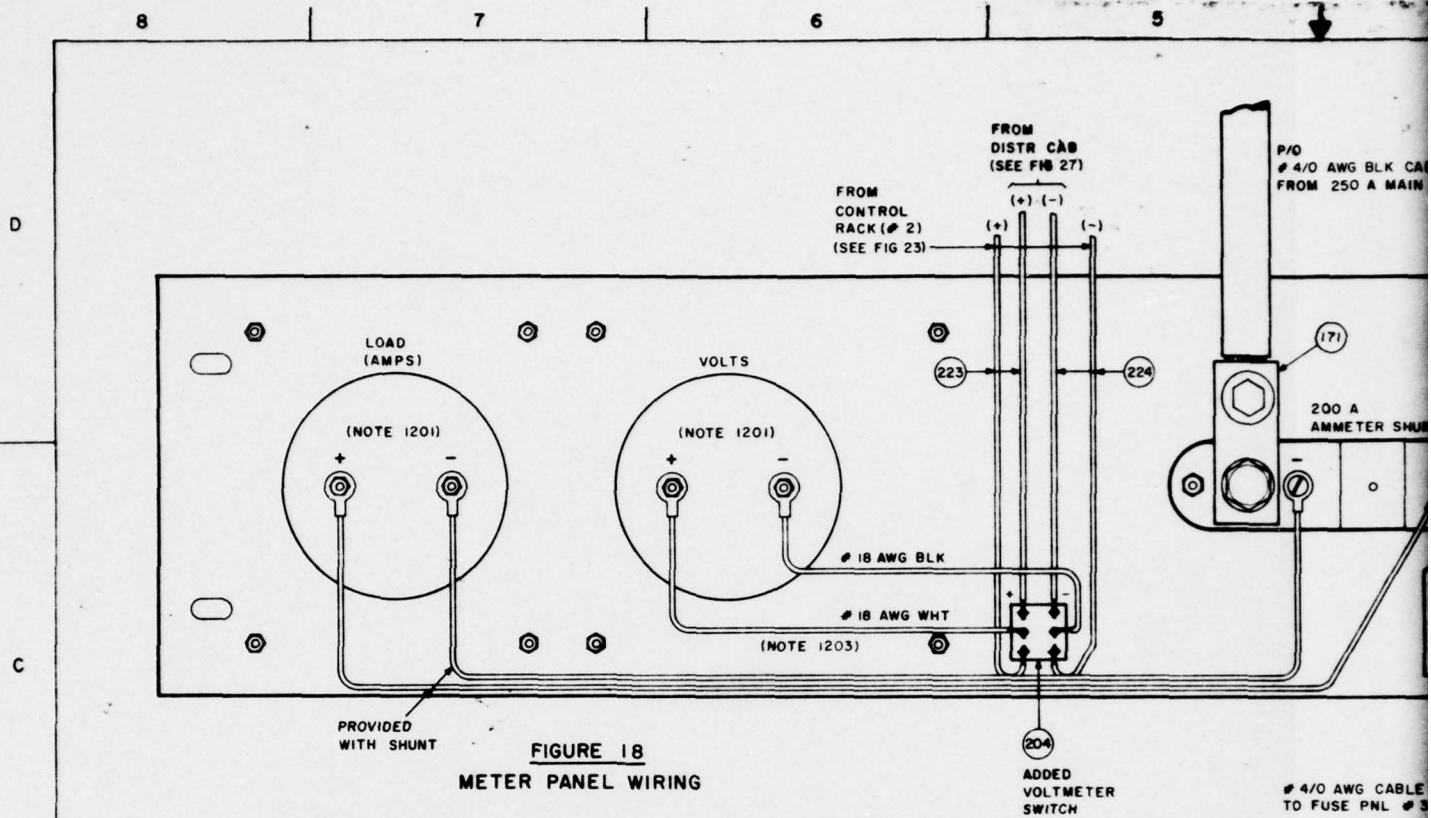
DRAWING NO.	
STD-MS-0020	
SHEET 11 OF 20	
DRAWN BY	SV/EDM
APPROVED	<i>[Signature]</i>

SIZE PERM CO
D 50470

SCALE

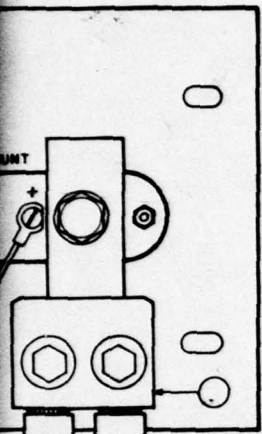
UNITS

4 3 2 1



4		3		2		1		
				REVISION				
				ZONE	REV	DESCRIPTION	DATE	APPROVED

ABLE
IN FUSE

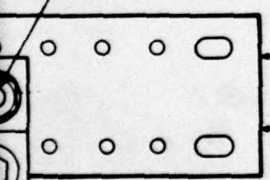


4/0 AWG CABLE
TO INTERCONNECT BAR
FOR 48V FUSE PNLS #1-2
(NOTE 1202)

NOTES:

- 1201. THE METER TERMINALS MAY BE REVERSED FROM THE WAY SHOWN. CONNECT TO THE CORRECT TERMINALS AS MARKED ON THE METER CASE.
- 1202. FORM THE CABLES AND SECURE THEM TO RELIEVE STRESS ON THE SHUNT TO PREVENT DAMAGE.
- 1203. USE BLACK-INSULATED WIRE FOR ALL (-) WIRING AND WHITE WIRE FOR ALL (+) METER AND SWITCH WIRING.
- 1204. AFTER INSTALLING ALL EQUIPMENT AND FUSE PANELS IN FRONT OF THE CABINET, MOUNT THE COPPER BUS BAR HORIZONTALLY ON THE RIGHT SIDE INSIDE THE CABINET (LOOKING FROM THE REAR) IN AN UNOBSTRUCTED LOCATION. SEE FIGURE 10 FOR THE APPROXIMATE LOCATION. USE THE INSULATORS ON EACH SIDE FROM THE LORATH INSULATING MOUNTING KIT. ENSURE THAT NO BOLT OR ANY METAL PART OF THE BUS BAR ASSEMBLY CONTACTS THE METAL CABINET. THE BUS BAR CAN BE SHORTENED IF NECESSARY TO PROVIDE ADEQUATE CLEARANCE ON ALL SIDES. SEE FIGURE 21 FOR MOUNTING DETAILS.

DRILL BOLT HOLE
TO FIT BOLT



(NOTE 1204)

P/O
4/0 AWG BLK CABLE TO
250 A MAIN FUSE PNL

STD-MS-0020		REVISED BY		DATE	
SHEET 12 OF 25		D 50470			
DRAWN BY S.D.M.		CHECKED BY			
APPROVED BY		DATE			

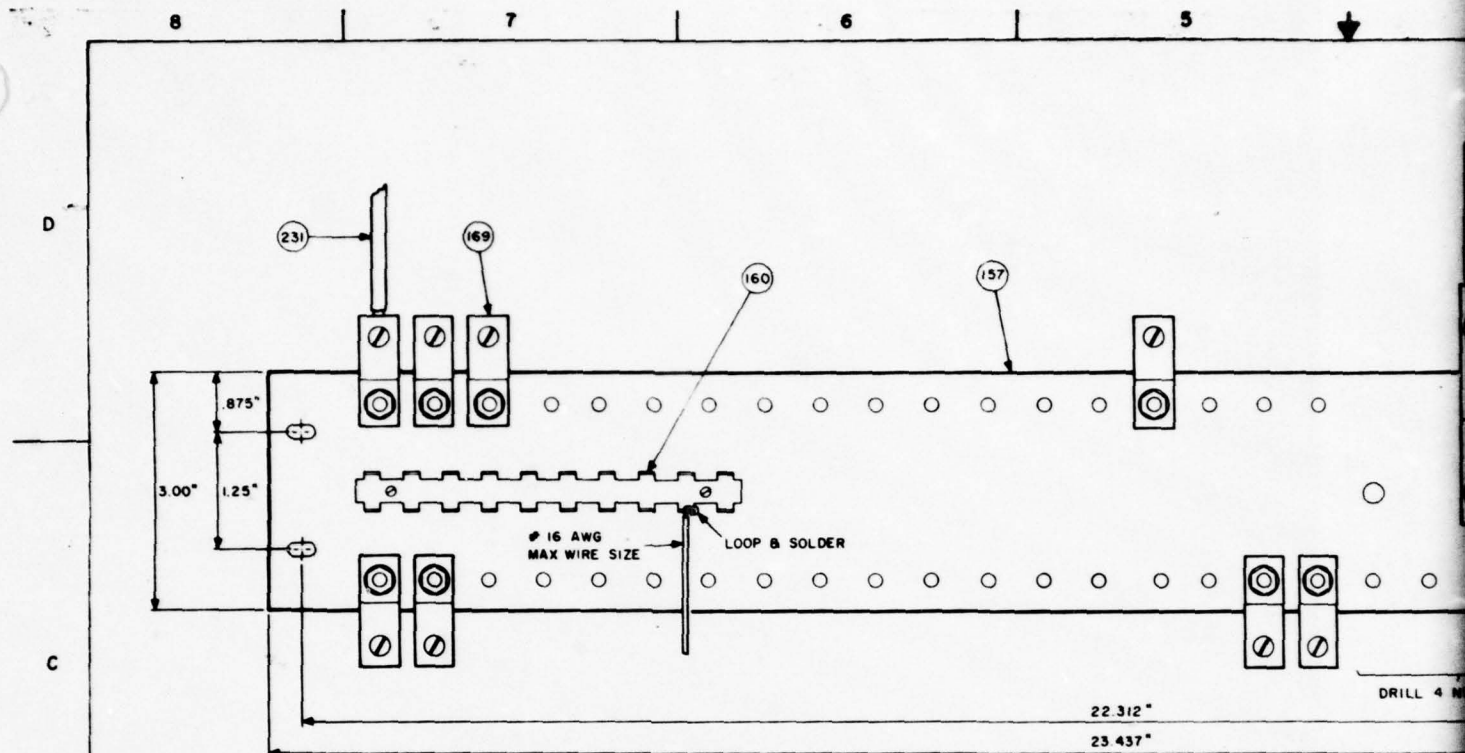


FIGURE 20
48V DC RTN BUS BAR WIRING
(NOTE 1301)

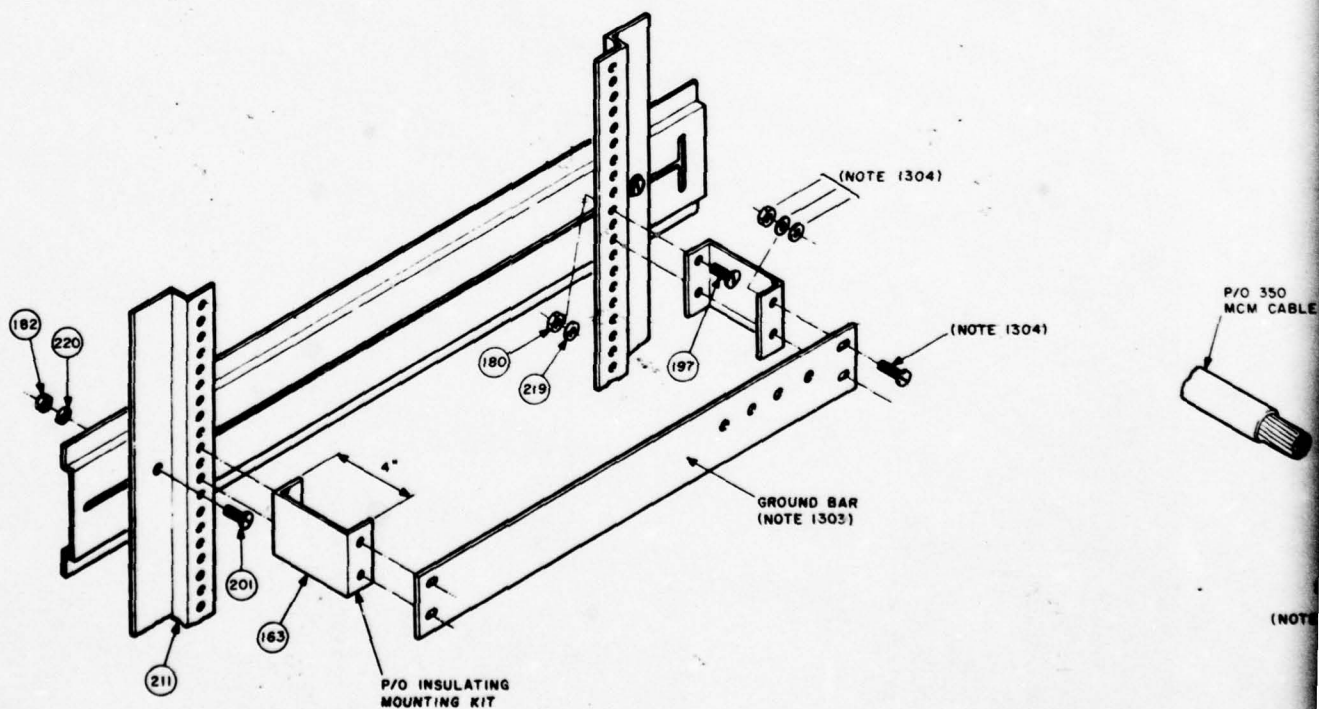
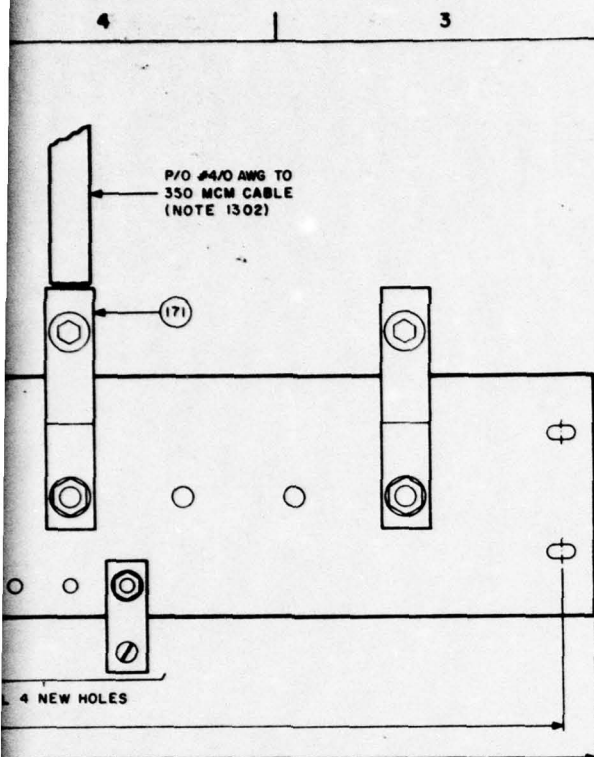


FIGURE 21
COPPER BUS BAR MOUNTING INSIDE CABINET

350 MCM CABLE S



REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

1301. AFTER INSTALLING ALL EQUIPMENT AND FUSE PANELS IN FRONT OF THE CABINET, MOUNT THE 48-V DC RETURN BUS BAR HORIZONTALLY ON THE LEFT SIDE INSIDE THE DC POWER DISTRIBUTION AND CONVERTER CABINET (LOOKING FROM THE REAR) IN AN UNOBSTRUCTED LOCATION. SEE FIGURE 10 FOR THE APPROXIMATE LOCATION. USE THE LORAIN INSULATING MOUNTING KIT. SEE FIGURE 21 FOR MOUNTING DETAILS.
1302. FORM THE 350 MCM CABLES TO RELIEVE STRESS ON THE BUS BAR. SECURE THE CABLES TO THE SIDE OF THE CABINET USING TY-RAPS OR LACING TWINE. IF IT IS NECESSARY TO REDUCE TO A SMALLER (MORE FLEXIBLE) CABLE SIZE, THE 350 MCM CABLES CAN BE REDUCED TO #4/0 AWG USING THE TUBULAR 2-WAY CONNECTORS SHOWN IN FIGURE 22.
1303. AFTER INSTALLATION, CHECK EACH BAR WITH AN OHMMETER TO THE CABINET BARE METAL TO ENSURE THAT IT IS INSULATED.
1304. PART OF INSULATING MOUNTING KIT.
1305. NO. 50 ALLEN WRENCH.
1306. COVER THE SPLICE WITH HEAT-SHRINK TUBING.

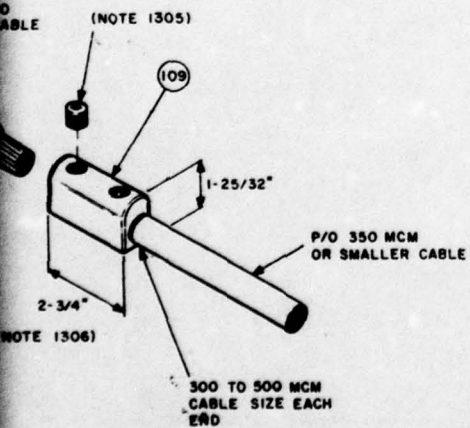
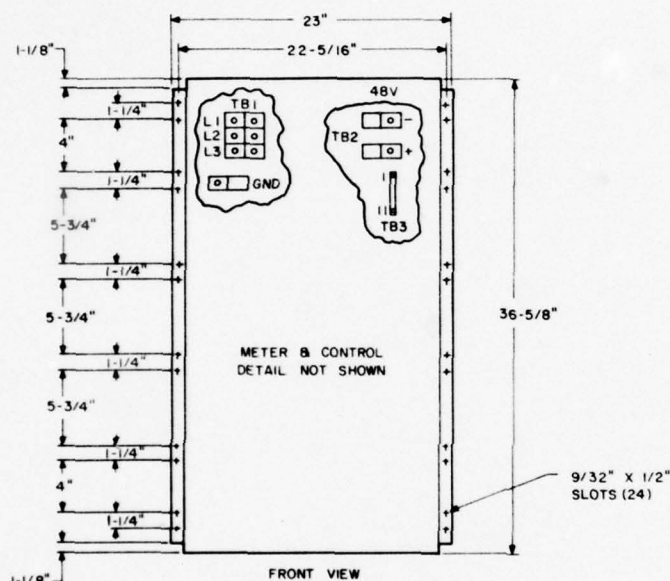
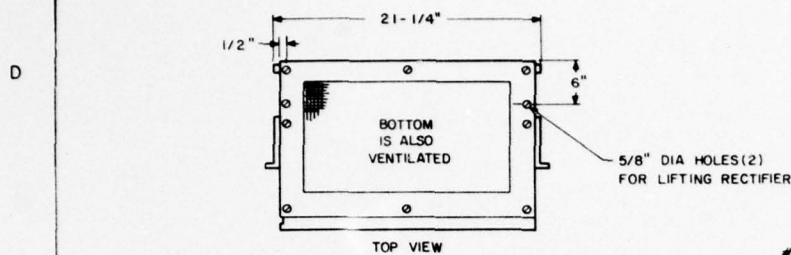
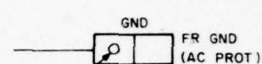
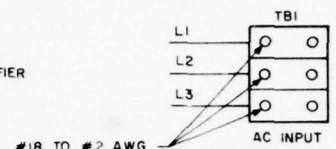


FIGURE 22
SPLICE OR WIRE SIZE REDUCER

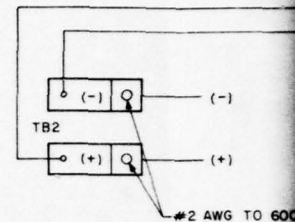
STD-MS-0020		SIZE	FIG. NO.	ISSUING NO.
SHEET 13 OF 25		D	50470	
DESIGNED BY	S. D. H.	SCALE	NONE	
APPROVED	<i>H. M. S.</i>			



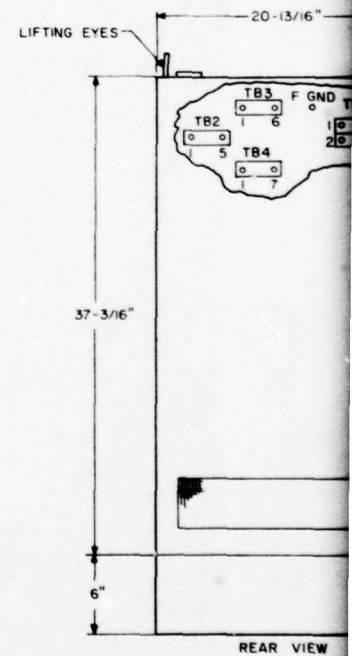
DETAIL F
RHM200C50 OR RHM 200D50 DIMENSIONS
& LOCATION OF TERMINAL BOARDS



AC & PROTECTIVE GROUND
CONNECTIONS



DETAIL G
MAIN RECTIFIER-CHARGER AC
ALARM, & CONTROL CONN



DETAIL H
2 KVA, 50 OR
FLOOR MOUNTING IN

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

1401. DISCONNECT AND TAPE THE LOCAL SENSE LEADS. CONNECT THE REMOTE BATTERY VOLTAGE SENSING WIRES.
1402. CHECK TO ENSURE THAT THIS CONNECTION IS IN PLACE FOR LOCAL EQUALIZE SWITCHING. REFER TO THE RECTIFIER-CHARGER INSTRUCTION MANUAL.

DISCONNECT
(NOTE 1401)TB3
ALARM &
CONTROL

RGI (+)

RBI (-)

REMOTE VOLTAGE SENSING

LOAD SHARING

NO

COM

NC

NO

COM

NC

REMOTE EQUALIZE

(STRAP FOR LOCAL CONTROL)
(NOTE 1402)

ALARMS (SEE SH 23, FIG 36)

D

C

B

A

DC POWER,
CONNECTIONS

OPTIONAL
BASE

60 HZ
INVERTER

STD-MS-0020
SHEET 14 OF 25

DRAWN BY G. VERDI

APPROVED HMI S-6

SIZE PSCW NO

D 50470

SCALE NONE

DRAWING NO

SHEET OF

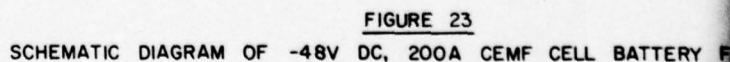
4

2

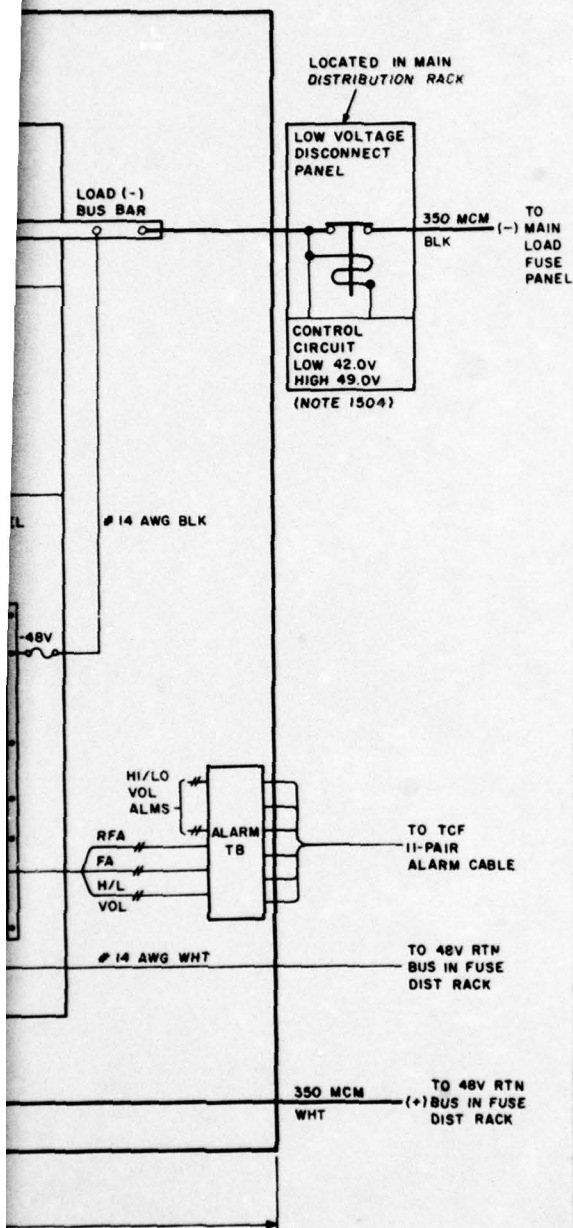
3

2

1



REVISION			
ZONE	REV	DESCRIPTION	DATE



LEGEND:

RFA - RECTIFIER FAIL ALARM
 FA - FUSE ALARM
 H/L, HI/LO - HIGH OR LOW VOLTAGE ALARM
 RB - REMOTE BATTERY SENSE LEAD (-)
 RG - REMOTE GROUND SENSE LEAD (+)
 / - NUMBER OF CONDUCTORS

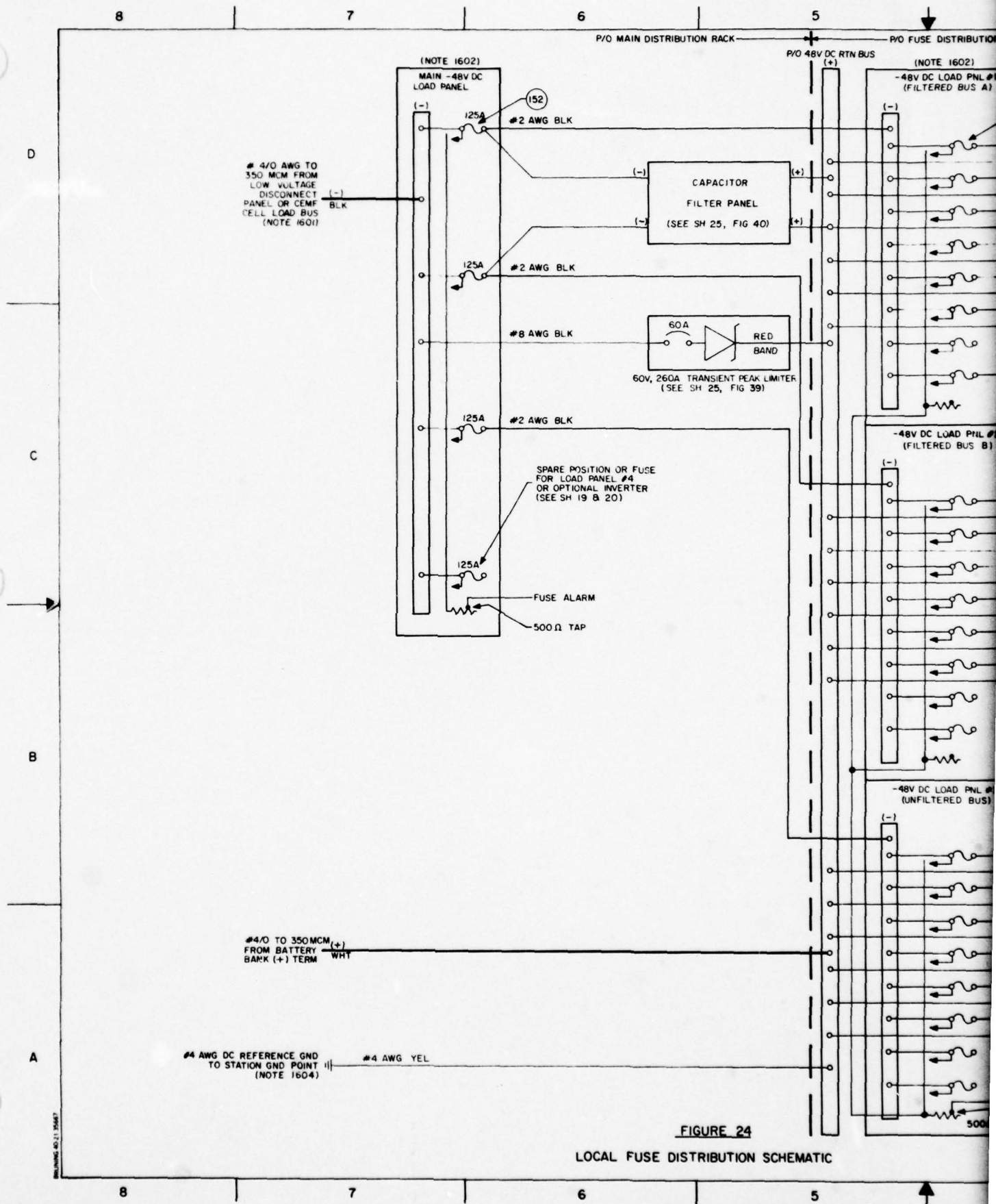
NOTES:

1501. THE RECTIFIER-CHARGERS ARE FILTERED FOR WIDEBAND ELECTRICAL NOISE NOT TO EXCEED 200 mVd-p WITH THE BATTERY BANK CONNECTED AND A RESISTIVE LOAD. THEY ALSO CONTAIN AUTOMATIC CURRENT LIMITING CIRCUITS TO PREVENT SHUTDOWN ON TEMPORARY OVERLOADS.
1502. DC POWER EQUIPMENT METALWORK MUST BE KEPT ISOLATED FROM SIGNAL GROUND CONDUCTORS TO PREVENT CONDUCTION OF ELECTRICAL NOISE TO COMMUNICATIONS EQUIPMENT.
1503. RECOMMENDED AC INPUT WIRING AND CIRCUIT BREAKER PROTECTION FOR THE RECTIFIER CHARGERS IS: 280/120 VAC, 3Ø, 60HZ, LORAIN RH200050 (#6 AWG WIRING AND 60 AMP BREAKER); 380/220 VAC, 3Ø, 50HZ, LORAIN RH200050 (#10 AWG WIRING AND 35 AMP BREAKER).
1504. THE LO-VOLTAGE DISCONNECT PANEL IS ONLY RECOMMENDED FOR USE IN THE 8-HOUR UNMANNED INSTALLATIONS.

STD-MS-0020
 SHEET 15 OF 25
 DRAWN BY S.D.M.
 APPROVED *Hill Selan*

SIZE 1/8" X 11" NO.
 D 50470
 SCALE NONE

DRAWING NO.
 SHEET OF



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

(148) (150) (151) (TYP)

- 1 TO M/W RADIO #1
PWR SUPPLY A
- 2 TO M/W RADIO #2
PWR SUPPLY A
- 3 TO DIGITAL OR ANALOG MUX #1
PWR SUPPLY A
- 4 TO DIGITAL OR ANALOG MUX #2
PWR SUPPLY A
- 5 TO DATA MODEMS
PWR SUPPLY A
- 6 TO LINE CONDITIONING
EQPT BAY #1
- 7 SPARE OR FUTURE
- 8 TO OPTIONAL TYPE 70 OR S8 FUSE PANEL
(SEE SH 9 FIGS 12, 13, 14 & SH 17 FIG 26)

TYPICAL DISTRIBUTION
TO ELECTRICALLY
"QUIET" LOADS
(NOTE 1603)

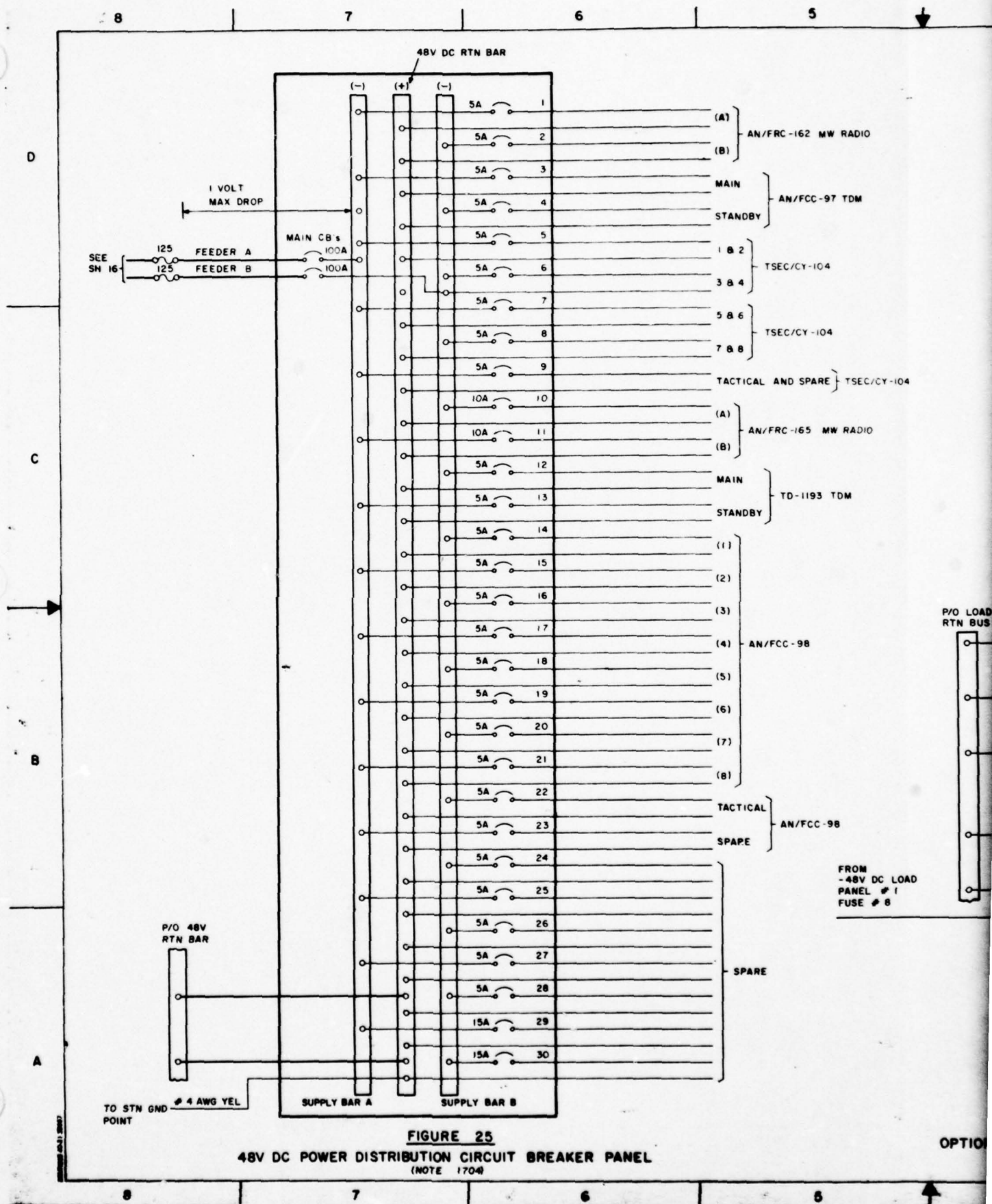
- 1 TO M/W RADIO #1
PWR SUPPLY B
- 2 TO M/W RADIO #2
PWR SUPPLY B
- 3 TO DIGITAL OR ANALOG MUX #1
PWR SUPPLY B
- 4 TO DIGITAL OR ANALOG MUX #2
PWR SUPPLY B
- 5 TO DATA MODEMS
PWR SUPPLY B
- 6 TO LINE CONDITIONING
EQPT BAY #2
- 7 SPARE OR FUTURE
- 8 SPARE OR FUTURE

TYPICAL DISTRIBUTION
TO ELECTRICALLY
"NOISY" LOADS
(NOTE 1603)

- 1 TO SFSU BAY
- 2 TO 20 HZ SUPPLY
- 3 TO DC/DC CONVERTER #1
- 4 TO DC/DC CONVERTER #2
- 5 MISC EQPT
- 6 MISC EQPT
- 7 SPARE OR FUTURE
- 8 SPARE OR FUTURE
FUSE ALARM
#20 AWG BLU

- NOTES:
- 1601. THE LO-VOLTAGE DISCONNECT PANEL IS ONLY RECOMMENDED FOR USE IN THE 8-HOUR UNMANNED INSTALLATION.
 - 1602. ACTUAL FUSING AND DISTRIBUTION WIRE SIZES WILL DEPEND ON LOADS AND LOOP DISTANCE TO THE EQUIPMENT BEING SUPPLIED.
 - 1603. THE DISTRIBUTION SHOWN IS TYPICAL FOR A MICROWAVE TERMINAL STATION AND DOES NOT REPRESENT ANY ACTUAL DISTRIBUTION. THE NUMBER AND TYPE OF LOAD PANELS USED MUST BE CHOSEN FOR SPECIFIC REQUIREMENTS.
 - 1604. THE DC REFERENCE GROUND CONDUCTOR SHOULD BE CONNECTED TO THE MAIN STATION GROUND POINT (IN GROUND BOX) OR AS CLOSE TO THE EXTERIOR EARTH GROUND ELECTRODE NETWORK AS POSSIBLE.

DESIG NO STD-MS-0020 SHEET 16 OF 25 DRAWN BY L. H. LEE APPROVED <i>[Signature]</i>	SIZE D SCALE NONE	DRAWING NO 50470 SHEET OF
---	-----------------------------------	--



REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

- 1701. THE MISCELLANEOUS FUSE PANELS ARE OPTIONAL AND WILL DEPEND ON STATION CONFIGURATION.
- 1702. TYPICAL FUSING FOR THESE PANELS WILL BE 1-1/3 TO 5 AMPS.
- 1703. DISTRIBUTION WIRE SIZES WILL DEPEND ON ACTUAL LOAD AND LOOP DISTANCE TO THE EQUIPMENT.
- 1704. THIS PANEL IS WALL-MOUNTED NEAR THE COMMUNICATIONS EQUIPMENT SUPPLIED. MORE THAN ONE PANEL CAN BE USED.

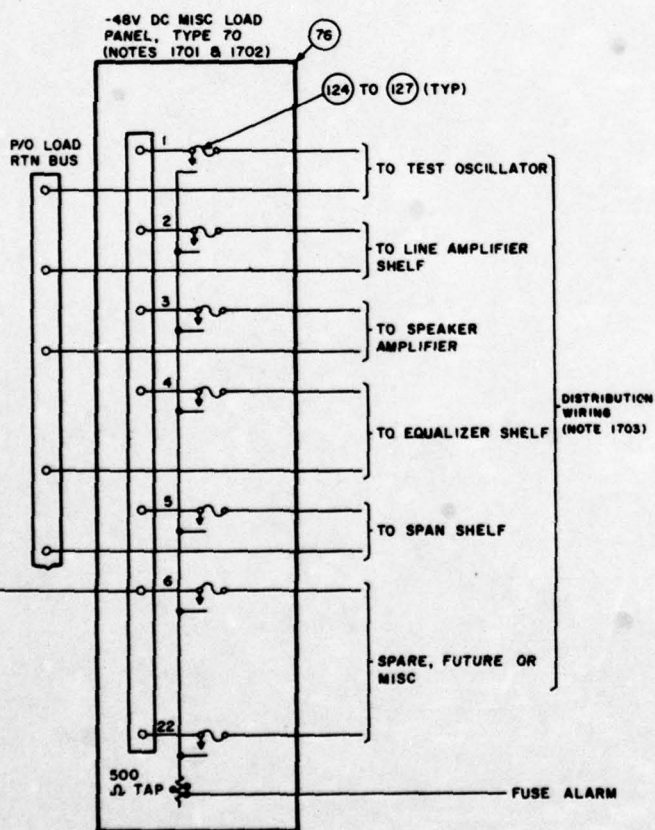
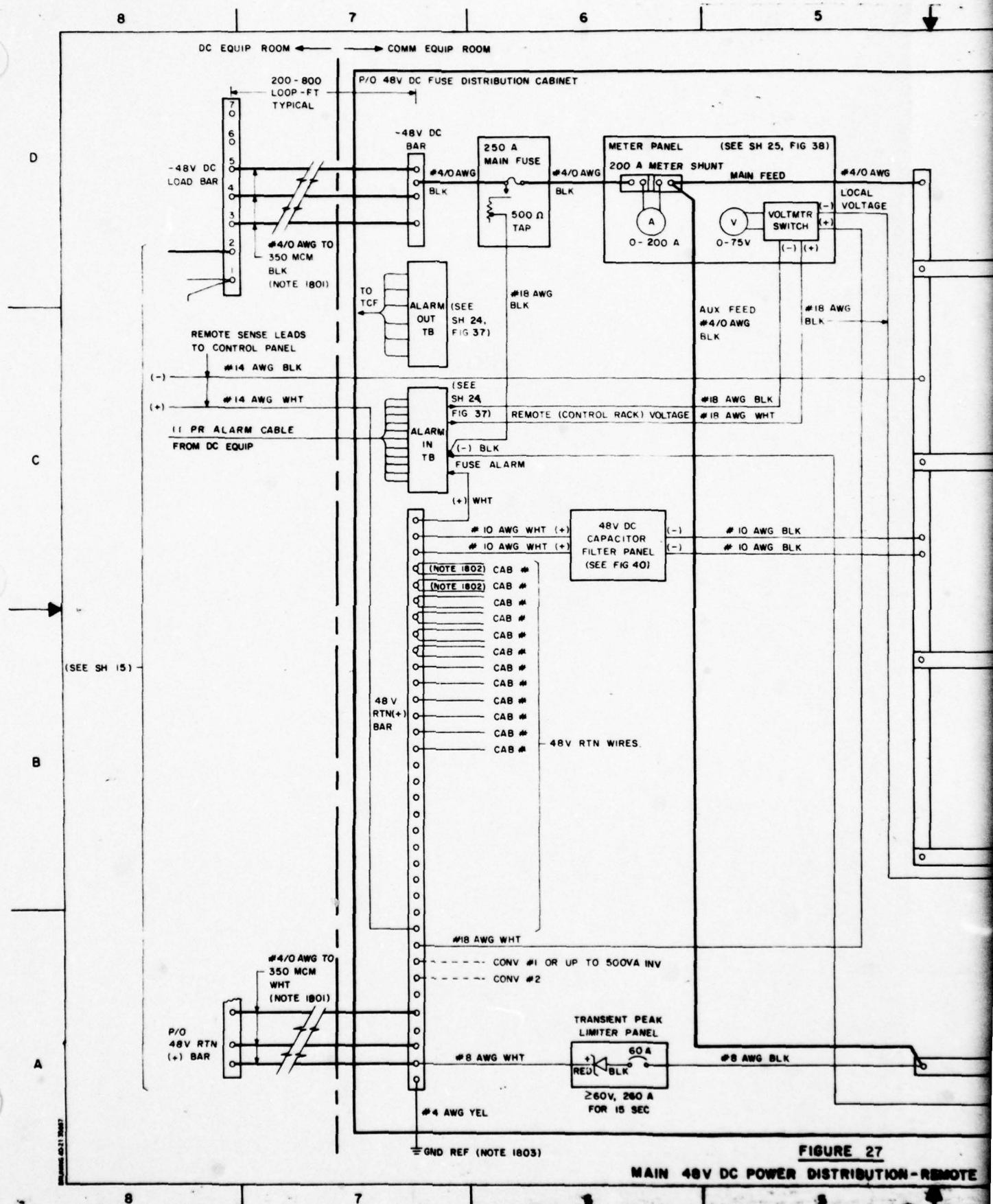
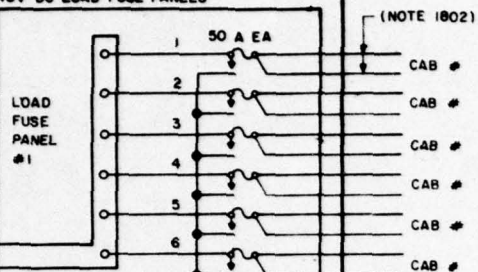
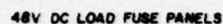


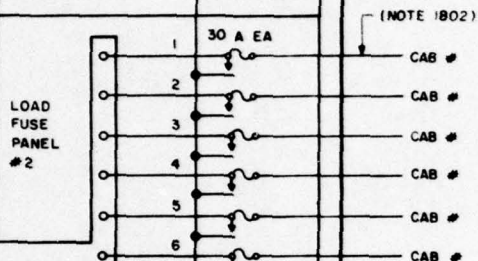
FIGURE 26
OPTIONAL MISCELLANEOUS 48V DC
DISTRIBUTION WIRING

STD-MS-0020		SIZE: 17 OF 28	DATE: 50470
DRAWN BY: S. D. H.		SCALE: NONE	APPROVED BY: <i>[Signature]</i>

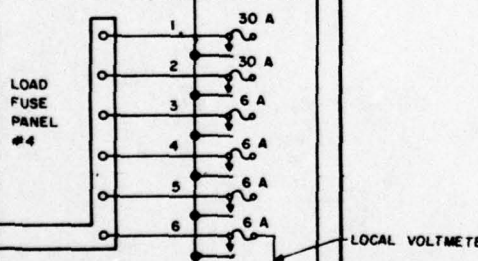
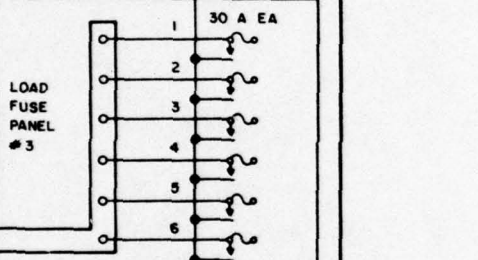




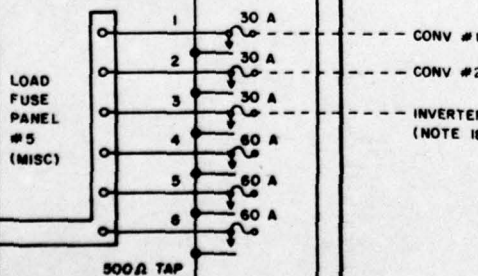
- (NOTE 1802)



(NOTE 1802)



LOCAL VOLTMETER



CONV #1

- CONV #2

INVERTER UP TO 500VA
(NOTE 1804)

500 A 1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

1801. SELECT THE NUMBER OF CABLES TO LIMIT DC VOLTAGE DROP TO 1 V FOR THE MAIN DC POWER RUN WITH A FULL LOAD.

1802. SIZE THE FEEDER CABLES FOR A VOLTAGE DROP NOT TO EXCEED 0.3 V DC AT FULL RATED CURRENT.

1803. THE REFERENCE GROUND WIRE IS CONNECTED TO THE STATION GROUND BOX.

1804. INVERTERS LARGER THAN 500 VA SHOULD BE INSTALLED IN THE DC EQUIPMENT ROOM.

STANDARD MS-0020
SHEET 18 OF 25

DRAWN BY G. VERDI
APPROVED *HMM*

SIZE	FSCM NO
D	50470

SCALE	NONE
-------	------

REMOTE CABINET

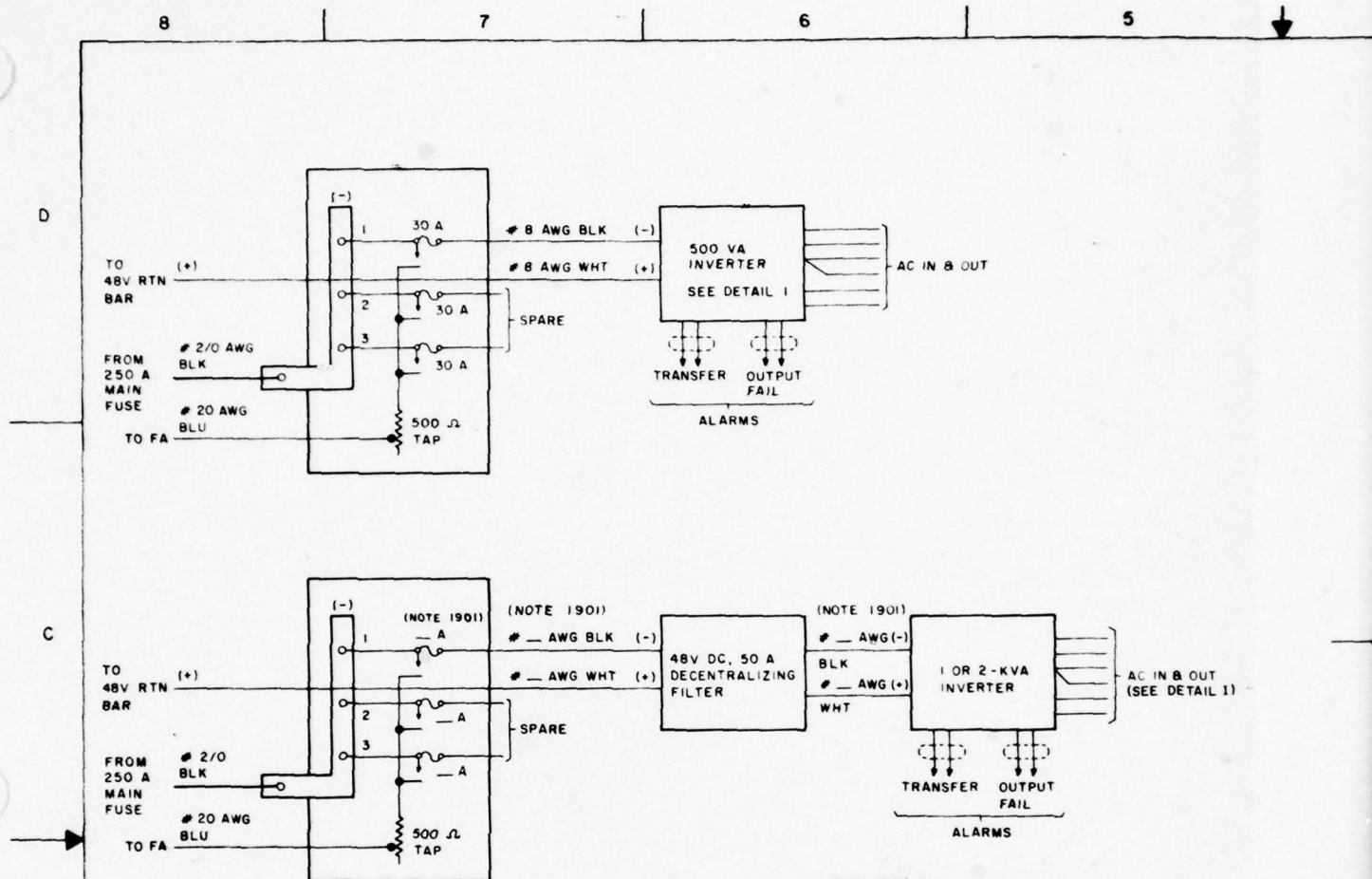


FIGURE 28
500VA, 1-, AND 2-KVA INV
DISTRIBUTION AND FILTERING

(NOTE 1903)

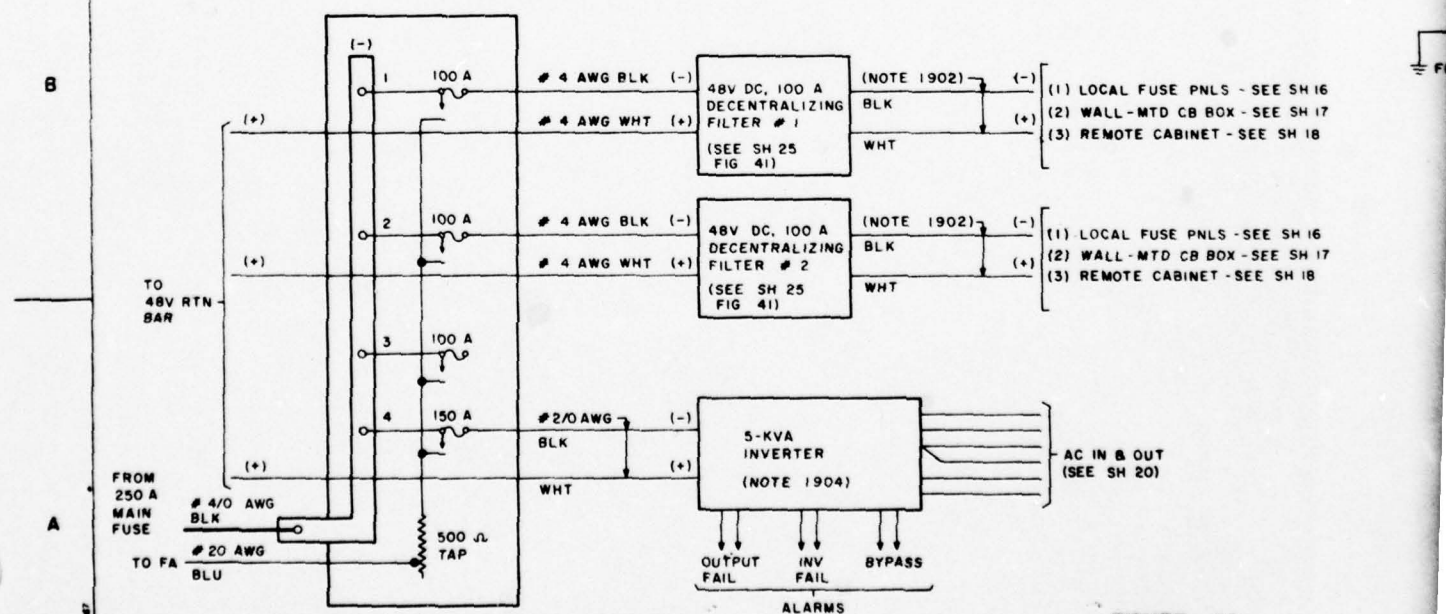
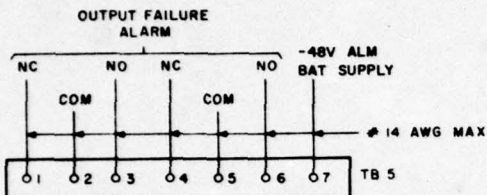
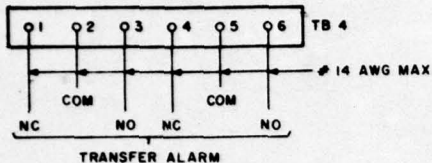


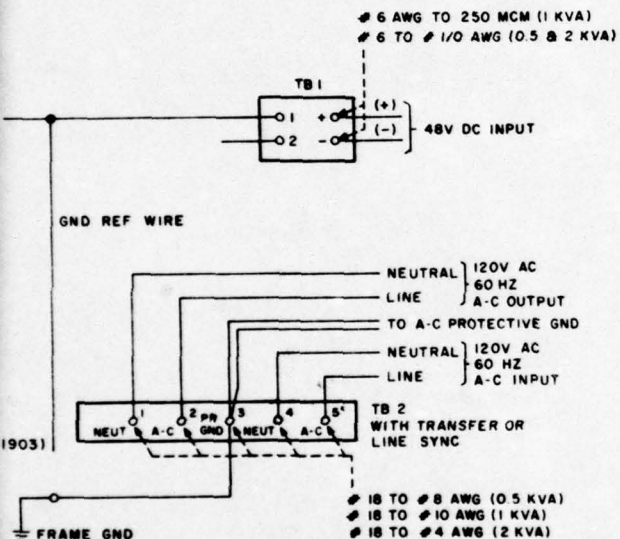
FIGURE 29
5-KVA INVERTER
DISTRIBUTION AND FILTERING

4		3		2		1	
				REVISION			
ZONE	REV	DESCRIPTION		DATE	APPROVED		



NOTES:

1901. SELECT THE FUSE RATING AND WIRE SIZE FROM TABLE 9.
1902. SELECT A WIRE SIZE TO LIMIT VOLTAGE DROP TO 0.5 V DC.
1903. IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
1904. SEE SHEET 20 FOR THE 5-KVA INVERTER CONNECTIONS.



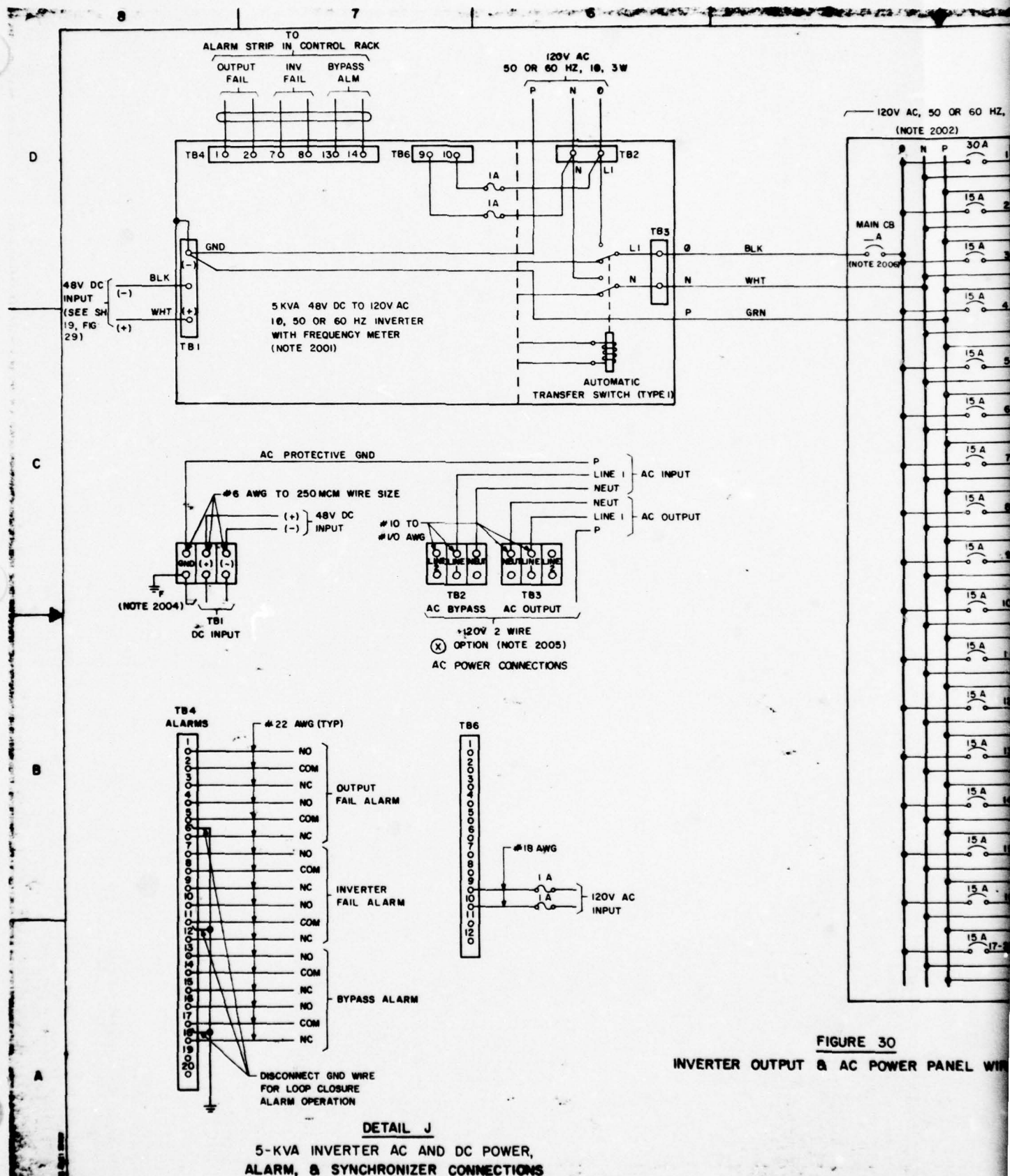
DETAIL 1

0.5, 1, & 2 KVA INVERTER AC & DC
POWER & ALARM CONNECTIONS

TABLE 9

INVERTER	1-KVA	2-KVA
FUSE SIZE, AMPS	35	60
WIRE SIZE, AWG (FOR LOOPS <20')	8	6

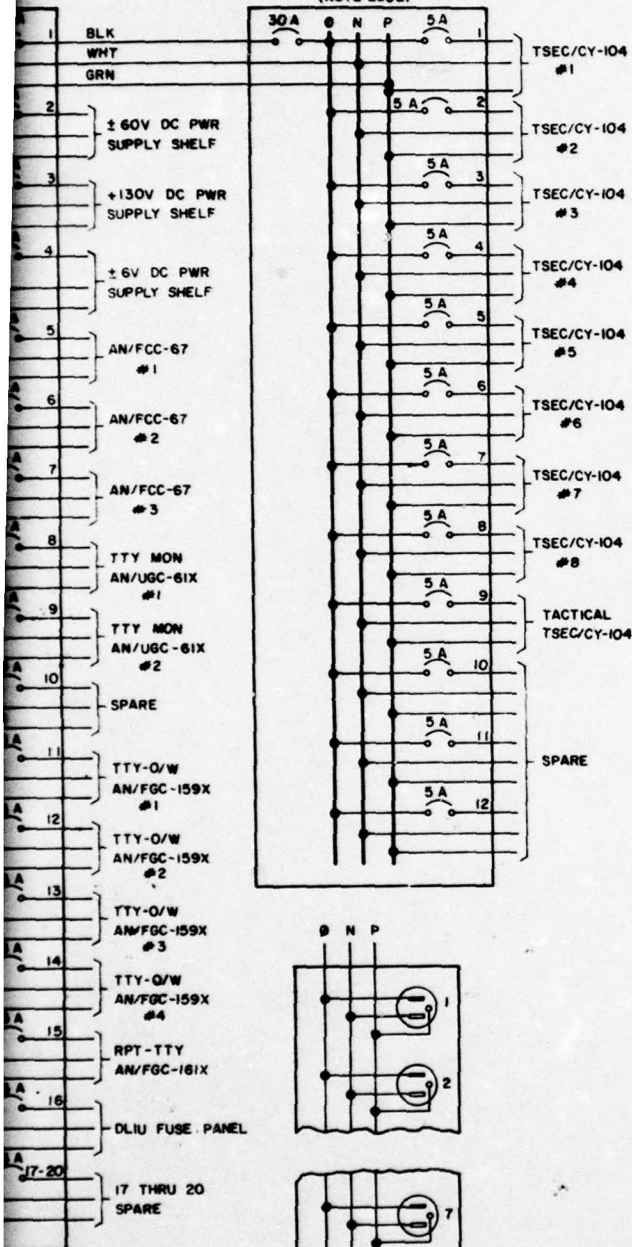
STANDARD MS-0020		SIZE: 11x17 IN	DATE: 10/25/55
DRAWN BY: S. D. H.	SCALE: NONE	APPROVED: [Signature]	DATE: 10/25/55



REVISION			
ZONE	REV	DESCRIPTION	DATE

HZ, 10, 3W INVERTER AC POWER DISTRIBUTION PANELS

(NOTE 2002)



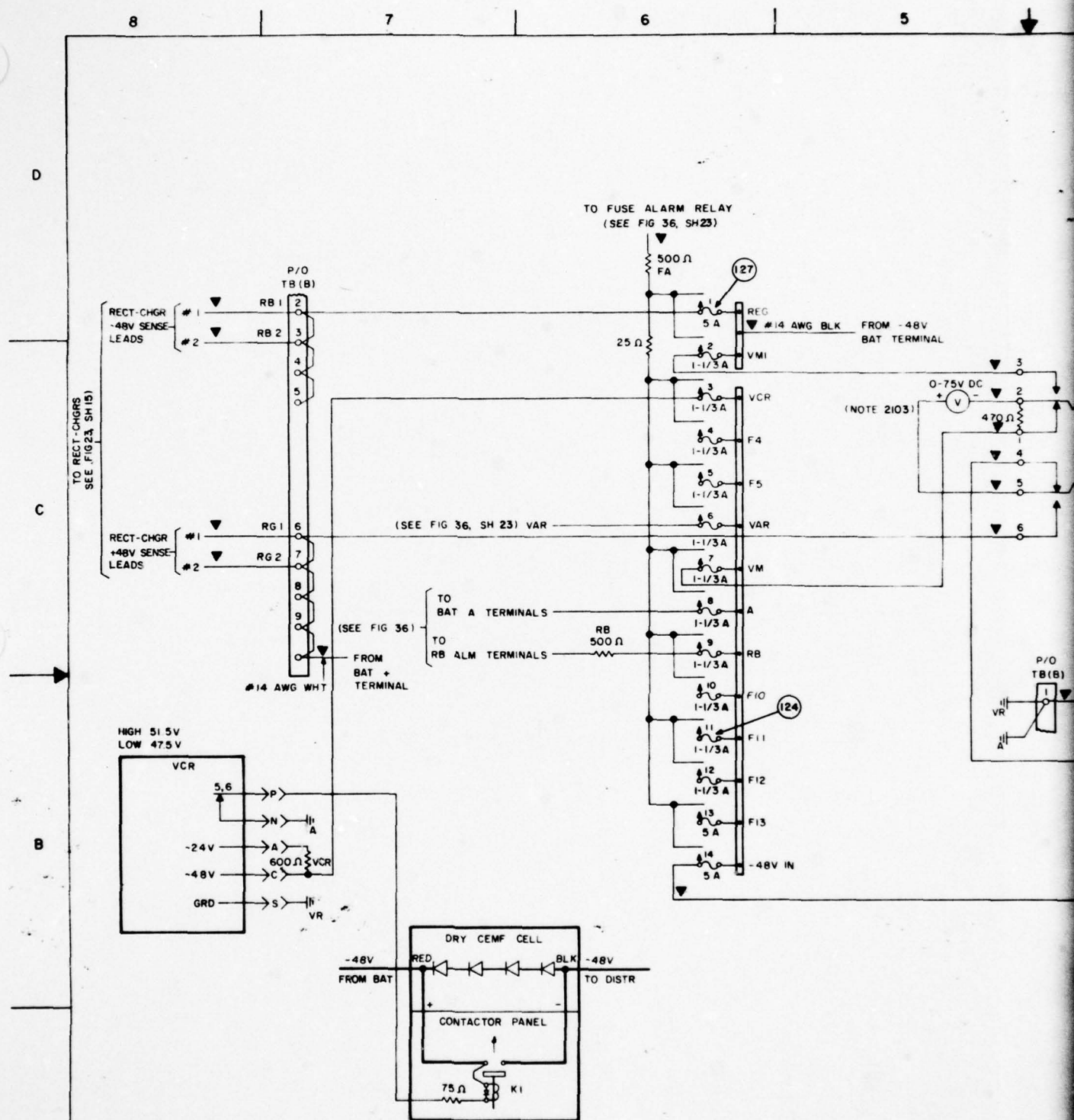
(NOTE 2003)

FIGURE 31
INVERTER 120V AC POWER
OUTLET STRIP IN CABINET

NOTES:

2001. THE AUTOMATIC TRANSFER SWITCH IS FACTORY INSTALLED AS PART OF THE INVERTER.
2002. THE INVERTER POWER PANELS SHOULD BE INCLUDED IN THE EIP.
2003. THE INVERTER 120-V AC POWER OUTLET STRIP IS IN ADDITION TO THE REGULAR UTILITY POWER OUTLET STRIP PROVIDED AS PART OF THE CABINET. THE TWO STRIPS CAN BE MOUNTED ON OPPOSITE SIDES. LABEL EACH.
2004. IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
2005. FOR THE 120/240V, 3 WIRE AND 240V, 2 WIRE OPTIONS Y AND Z WIRING, REFER TO THE MANUFACTURER'S INFORMATION SHEETS.
2006. SPECIFY THE MAIN CIRCUIT BREAKER SIZE BASED ON THE MAXIMUM INVERTER OUTPUT.

STANDARD STD-MS-0020	SIZE D	FIGURE NO. 50470	REVISION NO. 1
SHEET 20 OF 25	DATE 6 VERDI	SCALE NONE	SHEET OF
APPROVED Hm			



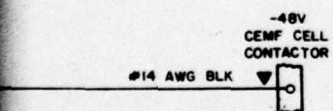
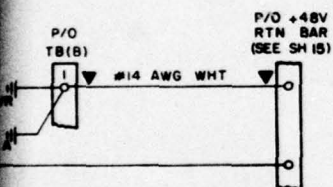
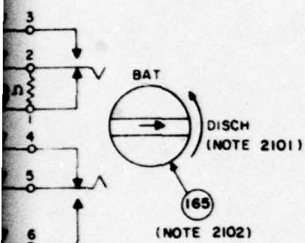
REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

RB - REMOTE BATTERY SENSE LEAD (-)
 RG - REMOTE GROUND SENSE LEAD (+)
 VM - VOLTMETER
 ▽ - INSTALLER WIRING
 (SEE SHEET 24 FOR OTHER LEGEND)

NOTES:

2101. DISTRIBUTION CABINET LOAD BAR VOLTAGE.
2102. REPLACE THE EXISTING 1C KEY SWITCH WITH THE 2C KEY SWITCH.
2103. CHECK THE METER WITH AN EXTERNAL METER TO VERIFY ACCURACY.



SYD-MS-0020		SHEET 11 OF 15	
DESIGNED BY	6 VERDI	DATE	50470
APPROVED	<i>[Signature]</i>	DATE	NOV 80

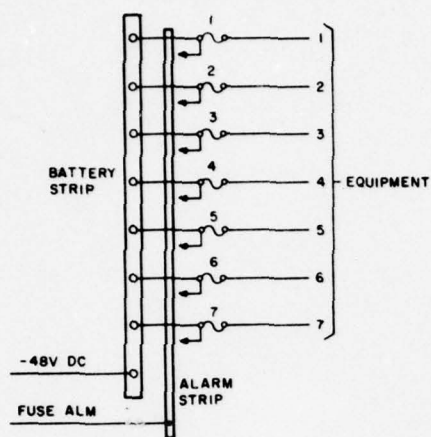
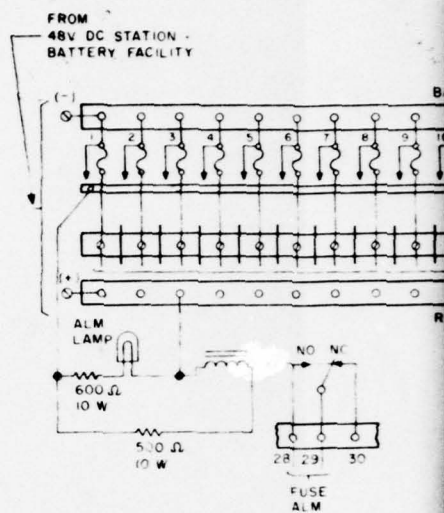
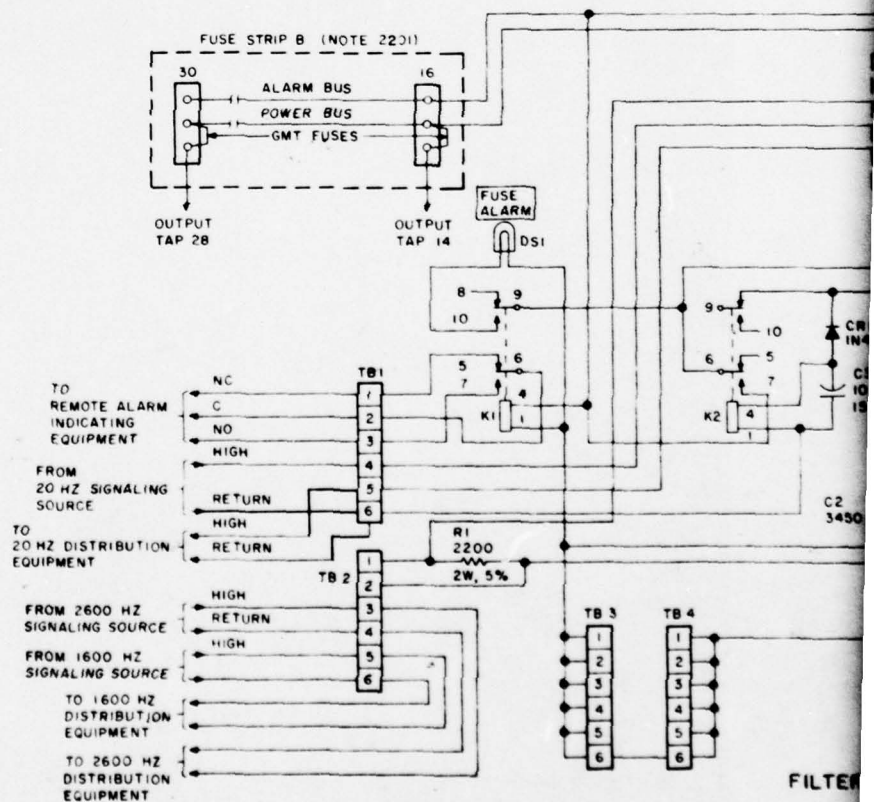


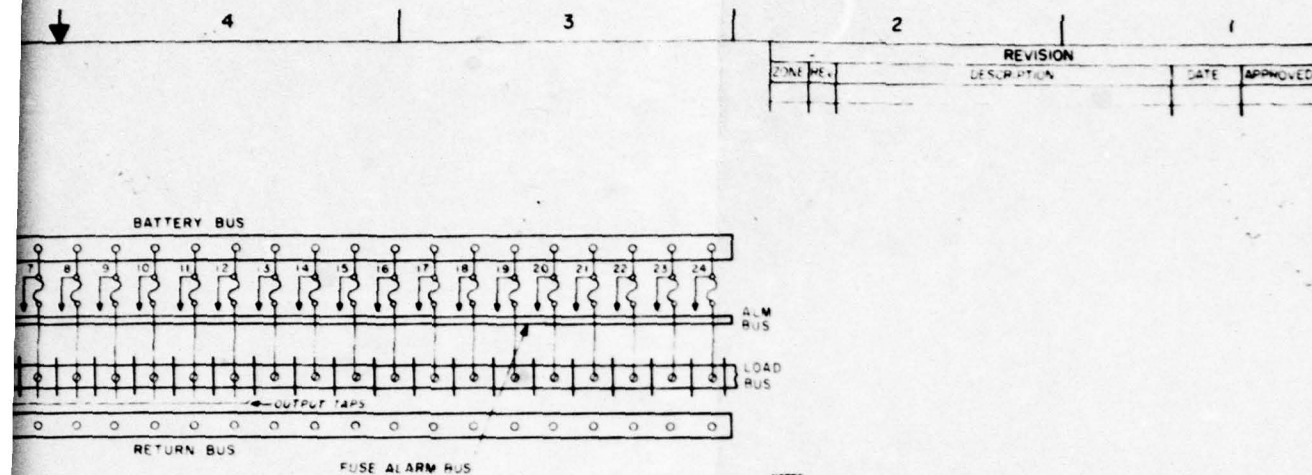
FIGURE 33

BUSS FUSE BLOCK SCHEMATIC



SB-1523/FT





- NOTES:
- 2201. FUSE STRIP B IS USED ONLY IN THE 30 FUSE (STELNA FP-30) CONFIGURATION.
 - 2202. FOR MORE INFORMATION REFER TO TM 11-5805-666-14P.

FIGURE 34

SB-1523/FT FUSE PANEL SCHEMATIC

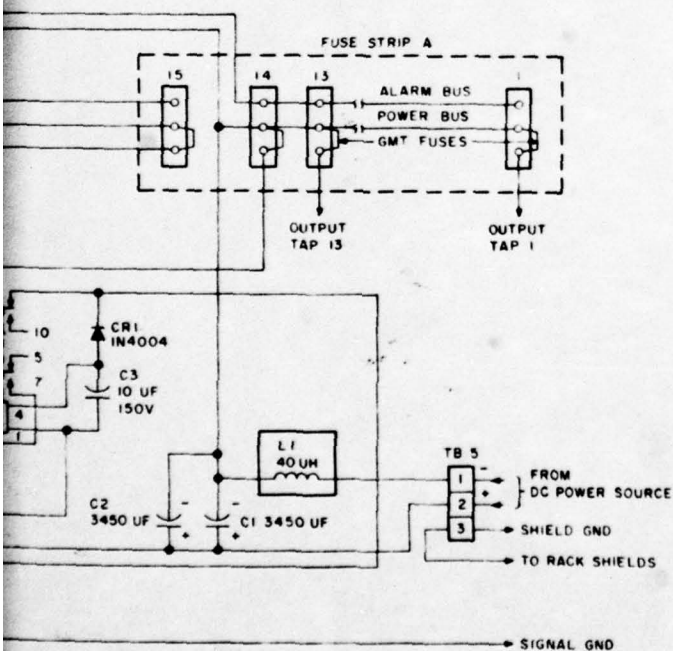


FIGURE 35
FILTERED GMT FUSE PANEL SCHEMATIC
SB-3800/FTC
(NOTE 22021)

STANDARD SHEET 28 OF 28		DESIGN NO. D 50470	REVISION NO.
APPROVED BY S.D.H.	SCALE NONE	SHEET OF	

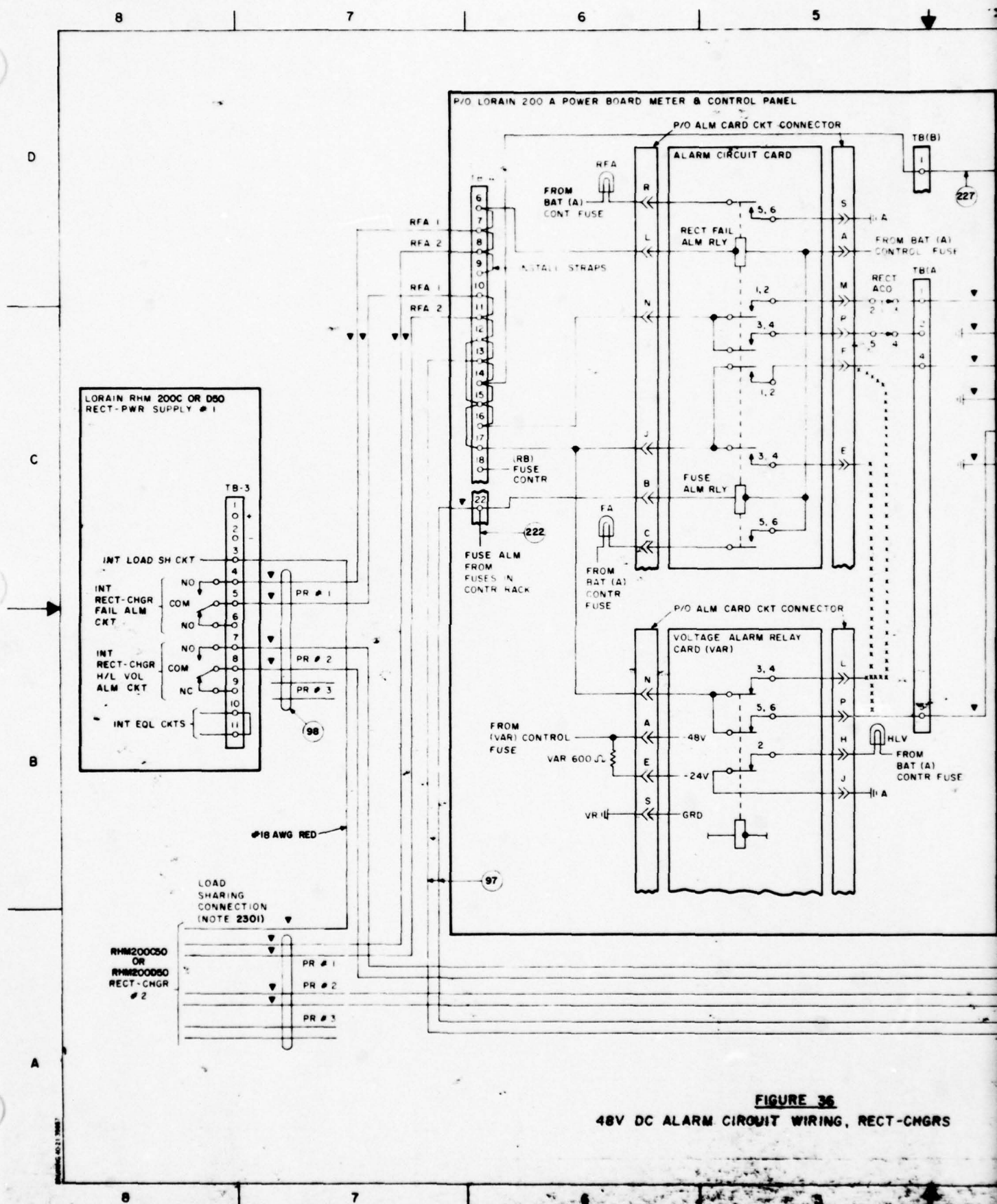
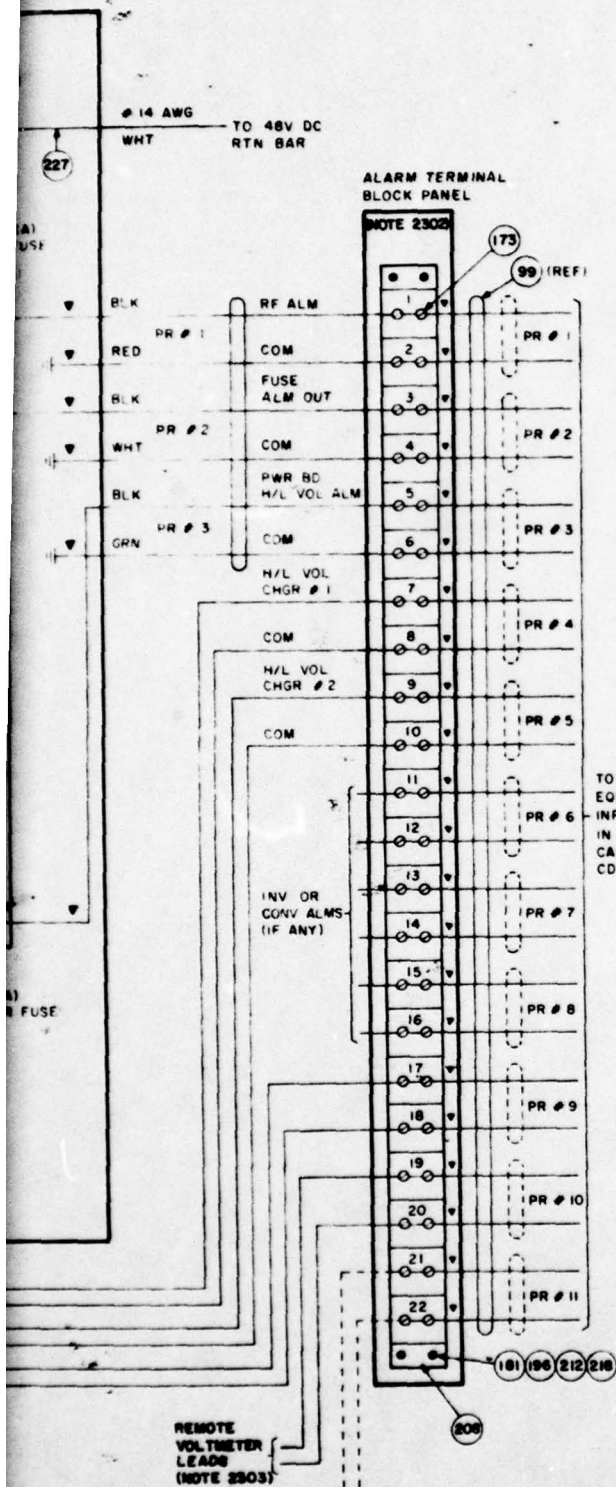


FIGURE 36
48V DC ALARM CIRCUIT WIRING, RECT-CHGRS

REVISION			
ZONE	REV.	DESCRIPTION	DATE



LEGEND:

NO	NORMALLY OPEN CONTACT
NC	NORMALLY CLOSED CONTACT
COM	MOVABLE CONTACT COMMON TO ABOVE OR RETURN LEAD
H/L V	HIGH/LOW VOLTAGE
FA	FUSE ALARM
RFA	RECTIFIER FAIL ALARM
RECT AGO	RECTIFIER ALARM CUTOFF KEY
RECT GO	CUTOFF LIGHT
VAR	VOLTAGE ALARM RELAY
VCR	VOLTAGE CONTROL RELAY
XXX	WIRING TO BE REMOVED
W	INSTALLER WIRING
A	POWER BOARD TO (A) 48-V RETURN CONNECTION
VR	VOLTAGE RELAY CARD GROUND RETURN
GRD	GROUND RETURN

NOTES:

2301. INTERCONNECT THE LOAD SHARING WIRE BETWEEN THE RECTIFIER-CHARGERS.
2302. SEE FIGURE 10 OF THIS DRAWING FOR MOUNTING INFORMATION.
2303. CONNECT AS SHOWN IN FIGURE 27.
2304. USE SOUND-POWERED PHONES OR OTHER INTERCOM TERMINALS (NOT PROVIDED).

STD-MS-0020		SIZE: 11x17 IN.	DRAWING NO.
SHEET 23 OF 28		D 50470	
DESIGNED BY: S D H	SCALE: NONE	SHEET OF	
APPROVED: <i>Paul J. Baker</i>			

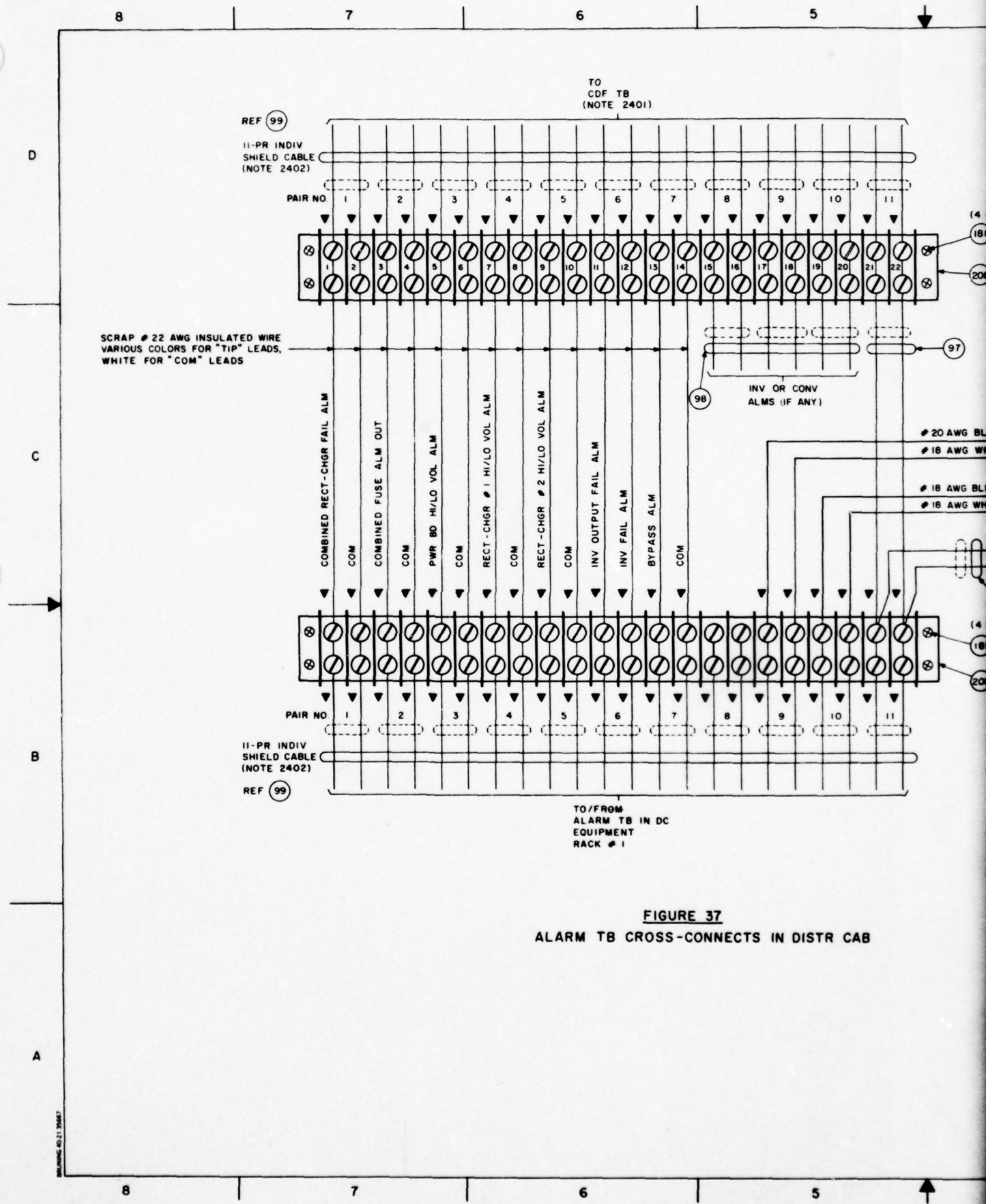


FIGURE 37
ALARM TB CROSS-CONNECTS IN DISTR CAB

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

▼ INSTALLER SOLDER CONNECTIONS.

NOTES:

2401. LOCATION AND STENCILING OF CDF TERMINAL BLOCK WILL BE INCLUDED IN SITE EIP.
2402. NO. 22 AWG OVERALL OR INDIVIDUALLY SHIELDED PAIR CABLE IS SUITABLE.
2403. FOR INTERCOM USE. THE CABLE, JACKS, AND INTERCOM TERMINALS AT EACH END ARE NOT PROVIDED. SOUND-POWERED PHONES ARE SUITABLE TERMINALS.

(4 PL)

181 196 212 218

208

97

20 AWG BLU (-) FROM
18 AWG WHT (-) LOAD FUSE ALM RESISTOR
(+) AND RETURN BAR (SEE FIG 10)

18 AWG BLK (-) TO
18 AWG WHT (-) VOLTMETER SWITCH IN
(+) DISTRIBUTION CABINET
(+) VOLT/AMMETER PANEL
(SEE FIGS 18 & 27)

(NOTE 2403)

97

(4 PL)

181 196 212 218

208

D

C

B

A

IDENT NO
STD-MS-0020

SHEET 24 OF 25

DRAWN BY S. D. H.

APPROVED *[Signature]*SIZE FSCN NO
D 50470

SCALE NONE

DRAWING NO

SHEET OF

4

2

3

2

1

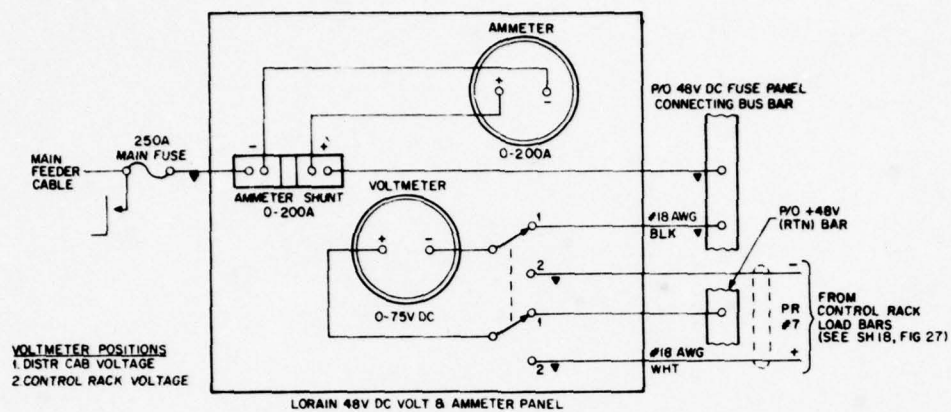


FIGURE 38
WIRING DIAGRAM OF 48 VOLT & AMMETER
PANEL IN DISTR CAB

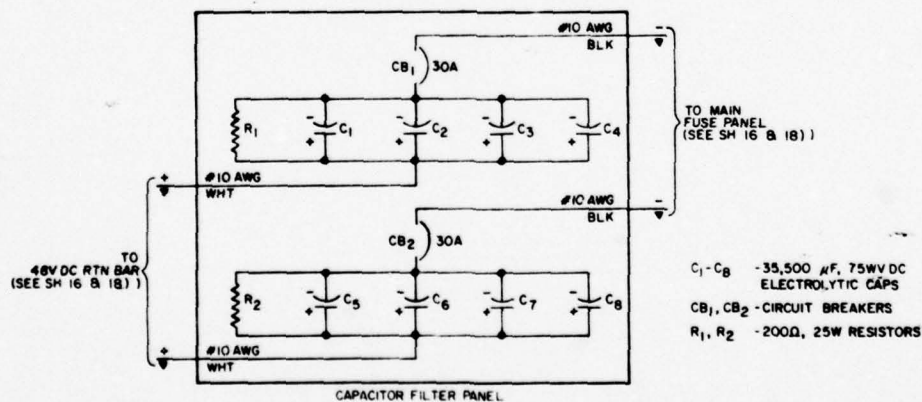
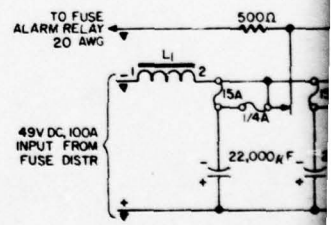
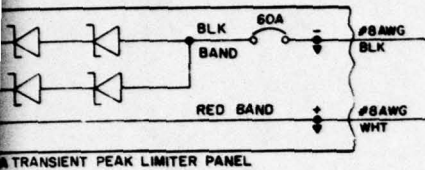


FIGURE 40
CAPACITOR FILTER PANEL
SCHEMATIC DIAGRAM



48V DC

REVISION			
ZONE	REV	DESCRIPTION	DATE



60A TRANSIENT PEAK LIMITER PANEL

FIGURE 39
60A DC TRANSIENT PEAK LIMITER
PANEL SCHEMATIC

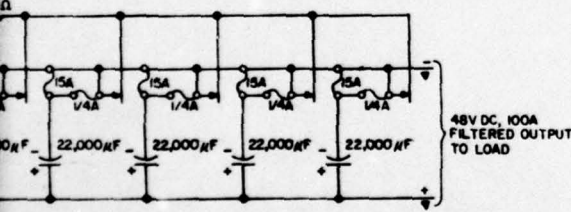


FIGURE 41
48V DC, 100A DC FILTER CIRCUIT

STANDARD SHEET 25 OF 25		TYPE / PLEN NO	NUMBER IN
DRAWN BY L. H. LEE		D 50470	
APPROVED <i>[Signature]</i>		SCALE NONE	SHEET OF

8	7	6	5
237 104740 WRT, WRT, BRASS, #10	5315-00-614-0048 EA		
238 03517M WIRE, ELEC, TW, STR, 4 AWG, BLK, INS, 600V	6145-00-184-5438 FT		
239 03500M WIRE, ELEC, TW, STR, 4 AWG, WHT, INS, 600V	6145-00-184-5435 FT		
240 03510M WIRE, ELEC, TW, STR, 4 AWG, BLK, INS, 600V	6145-00-923-2225 FT		
241 035010 WIRE, ELEC, TW, STR, 4 AWG, WHT, INS, 600V	6145-00-943-0728 FT		
242 03517M WIRE, SINGLE COND, 8 AWG BLK, SOL, INS, 600V	6145-00-470-8235 FT		
243 06535A WIRE, SINGLE COND, 8 AWG WHT, SOL, INS, 600V	6145-00-479-0642 FT		
244 03538M WIRE, SINGLE COND, 10 AWG BLK, SOL, INS, 600V	6145-00-990-2999 FT		
245 03507M WIRE, SINGLE COND, 10 AWG WHT, SOL, INS, 600V	6145-00-990-3000 FT		
246 11672A WIRE, ELEC, TW, 18 AWG RED, STR, INS, 600V	6145-00-989-5811 FT		
247 03509M WIRE, 14 AWG, WHT, SOL, 600V, INS	6145-00-050-7407 FT		
248 03540M WIRE, 14 AWG, BLK, SOL, 600V, INS	6145-00-050-7405 FT		
249 23193M WIRE, ELEC, TW, 18 AWG BLK, STR, INS	6145-00-524-9130 FT		
250 09217J WIRE, ELEC, TW, 18 AWG WHT, STR, INS	6145-00-681-8374 FT		
251 16954C WIRE, ELEC, TW, 20 AWG BLU STR, BELDEN 8919-10	NSNR		
252 09086C WASHER, LOCK, SPLIT, STEEL, 3/8"	5310-00-637-9541 EA		
253 10211A WASHER, LOCK, SPLIT, STEEL, CAD PLTD, 1/4"	5310-00-808-5381 EA		
254 06483J WASHER, LOCK, SPLIT, STEEL, #10	5310-00-045-3296 EA		
255 09019J WASHER, LOCK, SPLIT, STEEL, CAD PLTD, #8	5310-00-045-3295 EA		
256 08458A WASHER, FLAT, STEEL, 3/8"	5310-00-087-7493 EA		
257 06128L WASHER, FLAT, BRASS, 1/4"	5310-00-754-4337 EA		
258 14510M WASHER, FLAT, STEEL, CAD PLTD, 1/4"	5310-00-141-1795 EA		
259 06488D WASHER, FLAT, STEEL, #10	5310-00-167-0834 EA		
260 06487C WASHER, FLAT, STEEL, CAD PLTD, #8	5310-00-167-0833 EA		
261 23013Z VERTICAL SIDE SUPPORT SET, PAR-METAL, CYS-BA	NSNR		
262 24003Z TRANSIENT PEAK LIMITER PANEL, 23" X 7" 40V, 520A IAW DNG STD-MS-0023	NSNR		
263 21704R TRANSIENT PEAK LIMITER, 19" X 7", 40V, 260A IAW DNG STD-MS-0023	NSNR		
264 23199Z TERMINAL STRIP, 22 POSITIONS, CURTIS 1522 ST	NSNR		
265 21356A TERMINAL BLOCK, SQUARE D, TYPE 9080-CA-10	5820-00-301-3310 EA		
266 13561K TAPES, INSULATING, ELEC, BLACK 3/4" X 108"	5970-00-816-6036 RL		
267 23024E TAPES, INS, ELEC, WHITE, 1/4" X 216", 1500 V	5970-00-295-8161 RL		
268 23022C SWITCH, TOSWGL, DPDT, RADIO SHACK 275-1546	NSNR		
269 21662C GIVE PANEL CABINET, PAR-METAL #C5-043	NSNR		
270 00230J SCREW, CAP 3/8-16 X 1-1/2", HEX HD STEEL	5305-00-022-7798 EA		
271 10136J SCREW, MACH, STEEL, CAD PLTD, 1/4-20 X 1"	5305-00-908-1227 EA		
272 19640Y SCREW, CAP, BRASS, 1/4-20 X 5/8"	5305-00-935-7581 EA		
273 13953E SCREW, MACH, 12-24 X 3/4", PAN HEAD	5305-00-639-7970 EA		
274 19746A SCREW, MACH, 10-32 X 3/4", PAR-METAL GSC10-3	5305-00-301-1733 EA		
275 24423C SCREW, MACH, 10-32 X 1" LG, PAN HEAD	5305-00-059-7815 EA		
276 09098X SCREW, MACH PAN HD STEEL CAD PLTD, 8-32 X 1"	5305-00-296-1713 EA		
277 21847B PROTECTIVE SCREEN 23" X 48", LORAIN 4141-407	NSNR		
278 21846A PROTECTIVE SCREEN 23" X 36", LORAIN 4141-406	NSNR		
279 21827D PANEL, TERM, 23" X 3-1/2", LORAIN 4341-514	5975-00-301-3530 EA		
280 20978B PANEL, BLANK, 23" X 8-3/4", LORAIN 3535-102	NSNR		
281 20968E PANEL, BLANK, 23" X 7", LORAIN 3534-103	5975-00-301-3513 EA		
282 20979C PANEL, BLANK, 23" X 5-1/4", LORAIN 3533-106	5975-00-301-3512 EA		
283 20961F PANEL, BLANK, 23" X 3-1/2", LORAIN 3532-112	NSNR		
284 20942M PANEL, BLANK, 23" X 3-3/4", LORAIN 3531-106	NSNR		
285 21767M PANEL, BLANK, 19" X 10-1/2", LORAIN 1541-111	NSNR		
286 03034K PANEL, BLANK, 19" X 7" X 1/8", GREY	5975-00-051-7337 EA		
287 15288B PANEL, BLANK, 19" X 5-1/4" X 1/8", GREY	5975-00-975-4448 EA		
288 00879Z PANEL, BLANK, 19" X 3-3/4" X 1/8", GREY	5975-00-937-4503 EA		
289 24414E PANEL, AC OUTLET, 23", IAW DNG STD-MS-0017	NSNR		
290 00558H NUT, PLAIN, HEX, STEEL, CAD PLTD, 1/4-20	5310-00-285-1650 EA		
291 07675L NUT, PLAIN, HEX, STEEL, CAD PLTD, #8-32	5310-00-550-2490 EA		
292 09272C NUT, HEX, BRASS, 1/4-20	5310-00-141-3034 EA		
293 23042F MOUNTING CHANNEL, SQUARE D, TYPE 1028-C223XB	NSNR		
294 21720F LUG, TERMINAL, #2 AWG, TAB STAXON, RA-1123	5940-00-048-0847 EA		
295 10397B LUG, LOCKTITE, #4 AWG, TAB #31007	5940-00-636-5015 EA		
296 21711H LUG KIT, #1/0 AWG-350 MCM, LORAIN 4835-527	5180-00-301-3518 EA		
297 23040D LUG KIT, #1/0 AWG-500 MCM, LORAIN 4835-528	NSNR		
298 21824A LUG KIT, #4-3/0 AWG, LORAIN 4835-526	5180-00-301-3523 EA		
299 21708F LUG KIT, #14-4 AWG, LORAIN 4835-523	5180-00-301-3522 EA		
300 21710G LUG ADAPTER, ANGLE, LORAIN 3627-531	5940-00-301-3498 EA		
301 02622D LOCKWIT, CONDUIT, 2", TAB #146	5975-00-642-7263 EA		
302 23292H KEY SWITCH, IC, LORAIN 2523-314	NSNR		
303 21726B JUMPER, SQUARE D, TYPE 9080-JCA-6	NSNR		
304 23313D INSULATING MOUNTING ASSEMBLY 23" X 4", LORAIN 4133-036	NSNR		
305 23946Z HEAT-SHRINK INSULATOR, 500-1,000 MCM, TAB H5500-1,000	NSNR		
306 21695C HEAT BAFFLE, 23" X 3-1/2", LORAIN 4133-024	NSNR		
307 21712W GROUND TERMINAL STRIP, LORAIN 4835-530	5940-00-301-3520 EA		
308 23220J GROUND BAR, COPPER, 0-700A, 19" MTG, LORAIN 4361-039	NSNR		
309 23200A GROUND BAR, COPPER, 0-1000A, 23" MTG, LORAIN 4361-042	NSNR		
310 21709G FUSE PANEL BUS BAR, 4 PLS, LORAIN 3476-513	NSNR		
311 21729E FUSE BLOCK, 10 POLES, LITTLEFUSE 556010	NSNR		
312 21840E FUSE LINK, 400A, 250V, LORAIN 2484-651	5920-00-301-3496 EA		
313 21839E FUSE LINK, 250A, 250V, LORAIN 2484-645	NSNR		
314 21827E FUSE, NON-TYPE, 50A, LORAIN 2483-523	NSNR		

ITEM	SML	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					

6	5	4	3
159 21699F FUSE, NON-TYPE, 35A, LORAIN 2483-515	NSNR	EA	
160 18043D FUSE, TYPE 75 (INDICATING ALARM) 1-1/2A, LORAIN 2486-208	5920-00-904-2671 EA		
161 24047A FUSE, 5A, 250V, LORAIN 2483-505	NSNR	EA	
162 24440K FUSE, SAB, SLO-BLO, 15A, LITTLEFUSE 523015	NSNR	EA	
163 21723M FUSE, SAB, SLO-BLO, 10A, LITTLEFUSE 523010	NSNR	EA	
164 24439H FUSE, SAB, SLO-BLO, 5A, LITTLEFUSE 523005	NSNR	EA	
165 24438G FUSE, SAB, NORMAL, 15A, LITTLEFUSE 514015	NSNR	EA	
166 24437F FUSE, SAB, NORMAL, 10A, LITTLEFUSE 514010	NSNR	EA	
167 24436E FUSE, SAB, NORMAL, 5A, LITTLEFUSE 512005	NSNR	EA	
168 21724Z FUSE, SAB, NORMAL, 1A, LITTLEFUSE 512005	5920-00-280-3469 EA		
169 24435D FUSE, SAB, NORMAL, 3A, LITTLEFUSE 512003	NSNR	EA	
170 24434C FUSE, SAB, NORMAL, 2A, LITTLEFUSE 512002	NSNR	EA	
171 24433B FUSE, SAB, NORMAL, 1A, LITTLEFUSE 512001	NSNR	EA	
172 24449G FUSE, SAB, 15A, 250 V, LITTLEFUSE 314015	NSNR	EA	
173 24448F FUSE, SAB, ALARM, 5A, LITTLEFUSE	5920-01-007-5677 EA		
174 24447E FUSE, SAB, ALARM, 4A, BUSS	5920-00-806-6152 EA		
175 24446D FUSE, SAB, ALARM, 3A, LITTLEFUSE	5920-00-133-4898 EA		
176 24445C FUSE, SAB, ALARM, 2A, BUSS	5920-00-503-4843 EA		
177 24444B FUSE, SAB, ALARM, 1A, LITTLEFUSE	5920-01-007-5676 EA		
178 24443A FUSE, SAB, ALARM, 2A, BUSS	5920-00-295-7013 EA		
179 24442Z FUSE, SAB, ALARM, 1A LITTLEFUSE	5920-00-195-2330 EA		
180 24441J FUSE, SAB, ALARM, 1A, BUSS	5920-00-665-0515 EA		
181 24479W FUSE, 1/4A WITH 10 OHM RESISTOR, LORAIN 2486-203	NSNR	EA	
182 23989H FUSE, INDICATING, TYPE 70, 5A	5920-00-538-6205 EA		
183 24428H FUSE, INDICATING, TYPE 70, 3A	5920-00-284-9218 EA		
184 24427G FUSE, INDICATING, TYPE 70, 2A	5920-00-284-9217 EA		
185 24426F FUSE, INDICATING, TYPE 70, 1-1/2A	5920-00-539-6347 EA		
186 24432A FUSE, GRASSHOPPER, 10A, BURNED FILOITS	5920-00-624-2661 EA		
187 24431Z FUSE, GRASSHOPPER, 7-1/2A, GTE 027087A11	5920-00-857-8418 EA		
188 17237Z FUSE, GRASSHOPPER, 5A, BUSSMAN 35H	5920-00-122-3775 EA		
189 16432K FUSE, GRASSHOPPER, 3A, BUSSMAN 35G	5920-00-156-0837 EA		
190 24430J FUSE, GRASSHOPPER, 2A, BUSSMAN 35L	5920-00-556-9728 EA		
191 14624E FUSE, GRASSHOPPER, 1-1/2A, BUSSMAN 35B	5920-00-156-0838 EA		
192 24831D FUSE, GNT 10, 10A, LORAIN 2486-112	NSNR	EA	
193 17144N FUSE, GNT 5, 5A	5920-00-857-8417 EA		
194 24425E FUSE, GNT 3-1/2, 3-1/2A	5920-01-056-7256 EA		
195 16582Y FUSE, GNT 3, 3A	5920-00-081-5958 EA		
196 24424D FUSE, GNT 2, 2A	5920-00-857-8933 EA		
197 10333D FUSE, GNT 1, 1A	5920-00-901-9936 EA		
198 00740C EXPANSION, SHIELD, 3/8" - 16, MACH BOLT	5340-00-754-4560 EA		
199 21725A COPPER STRIP, 1/2" W, 5" L, 1/32" THICK	NSNR	EA	
200 24413D CONNECTOR, CABLE, DOUBLE BARREL, FOR 300-500 MCM COPPER CABLES, TAB 32015-BD	NSNR	EA	
201 23219W CONNECTOR, CABLE, SINGLE BARREL FOR 300-500 MCM COPPER CABLES, TAB 32515	5940-00-982-8096 EA		
202 24412C CONNECTOR, TWO-WAY, #4/0 AWG-300 MCM, TAB 32513	5940-00-961-0477 EA		
203 21819G COMPOUND, SEALING, NONHARDENING PERMAGUM	NSNR	EA	
204 24404F CAPACITOR FILTER PANEL, 23" X 7", IAW DNG STD-MS-0003	NSNR	EA	
205 24405G CAPACITOR FILTER PANEL, 19" X 7", IAW DNG STD-MS-0003	NSNR	EA	
206 03755D CABLE, STR INS, 600V, 350 MCM, BLK	6145-00-417-5797 FT		
207 21830F CABLE, STR INS, 600V, 350 MCM, WHT, ANIXTER # 6B-3501	NSNR	FT	
208 03494M CABLE, SINGLE COND, STR, INS, 600V, #2/0 AWG, BLK	6145-00-174-1123 FT		
209 15130Y CABLE, SINGLE COND, STR, INS, 600V, #2/0 AWG, WHT	6145-00-479-0036 FT		
210 03516G CABLE, SINGLE COND, #2 AWG, BLK, STR	6145-00-051-9790 FT		
211 20993E CABLE, 11-PR, #22 AWG, BELDEN 8765	6145-00-081-1049 FT		
212 21717D CABLE, 3-PR, #22, STR, BELDEN 9745	NSNR	FT	
213 15104A CABLE, 1-PR, #20 AWG, STR, INS	6145-00-845-5206 FT		
214 21705C RUSHING, 2" OD, CHASE NIPPLE, TAB 1947	5975-00-710-0876 EA		
215 24422B SWITCH, SAFETY 3-POLE, 240V, 200A, D0324	NSNR	EA	
216 24402D RECTIFIER-CHARGER, END CELL, 7 VOLT, 25A OUTPUT, LORAIN RJ25F7, 115/230 V AC, 50/60 HZ	6130-00-304-0141 EA		
217 22232A RECTIFIER-CHARGER, 48-V DC, 200A; 3 0, 3RD V AC, 50/60 HZ; LORAIN RHM200C50	6130-00-301-3508 EA		
218 24366A RECTIFIER-CHARGER, 48-V DC, 200A; 3 0, 208 V AC, 60 HZ; LORAIN RHM200D50	NSNR	EA	
219 22202D RACK, 23" X 7", LORAIN 4124-010	5975-00-301-3525 EA		
220 22110Z POWER BOARD, 48 V, 400A, 23" WIDE, E/M; (A) 400A METER & CONTROL PANEL; (B) 400A, ONE-STEP, END-CELL SWITCH FOR 3 END CELLS; (C) TEST PANEL; AND (D) INSULATED 700A GROUND BAR, LORAIN 1241A3 LIST 4	NSNR	EA	
221 22113C METER PANEL ASSEMBLY, CONSISTING OF METER PANEL, E/M 75-VOLT DC VOLTMETER LORAIN 4374-018	5805-00-177-2919 EA		
222 24419Z AMPHETER, 0- TO 400-AMP, LORAIN 2925-778	NSNR	EA	
223 24420Z AMPHETER SHUNT, 400-AMP, LORAIN 2982-717	NSNR	EA	
224 24421A SHUNT MOUNTING BLOCK, LORAIN 3815-102	NSNR	EA	
225 22410C KIT, EMERGENCY BATTERY SAFETY	NSNR	EA	

ITEM	SML	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					

D

C

B

A

4	3	2	1
2185TE	INVERTER, 500-VA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MA4501B	NSNR	EA
2440BZ	INVERTER, 1-KVA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MA102B	NSNR	EA
24410A	INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1Ø 50/60 HZ, LORAIN XMBG202B1	NSNR	EA
24409A	INVERTER, 2-KVA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MA4202B	NSNR	EA
1B332N	INVERTER, 5-KVA, 48-V DC TO 120-V AC, 1Ø, 60 HZ, LORAIN MAQ502B	NSNR	EA
24407N	INVERTER, 10-KVA, 48-V DC TO 120-V AC, 1Ø 60 HZ, LORAIN MAQ103B	NSNR	EA
24406H	INVERTER, 10-KVA, 48-V DC TO 120-V AC, 1Ø 50 HZ, LORAIN MAQ103B	NSNR	EA
21689H	FUSE PANEL, ONE 61-400A FUSE POSITION, LORAIN 4316-012	5920-00-177-2738	EA
21691J	FUSE PANEL, SIX 31-60A FUSE POSITIONS, LORAIN 4316-507	NSNR	EA
1B825D	FUSE PANEL, SIX 0-30A FUSE POSITIONS, LORAIN 4316-505	NSNR	EA
22114D	FUSE PANEL, THREE 0-30A, THREE 31-60A FUSE POSITIONS, LORAIN 4316-506	NSNR	EA
24418W	FUSE PANEL, (18) 0-5A TYPE 70 FUSES, LORAIN 4317-408	NSNR	EA
24417H	FUSE PANEL, 48-V DC, 23" X 3-1/2", THREE 0-30A FUSE POSITIONS, LORAIN 4315-005	5920-00-156-3683	EA
24416G	FUSE PANEL, 48-V DC, 23" X 3-1/2", THREE 31-60A FUSE POSITIONS, LORAIN 4315-006	5920-00-156-3690	EA
1B159K	FUSE PANEL, EIGHT 0-30 FUSE POSITIONS LORAIN 4317-008	5920-00-878-4817	EA
24129F	FUSE PANEL, FOUR 0-30A & FOUR 31-60A FUSE POSITIONS, LORAIN 4317-010	NSNR	EA
21942H	FUSE PANEL, (8) 31-60A FUSE POSITIONS LORAIN 4317-009	NSNR	EA
24401C	FUSE PANEL, FOUR 61-400A FUSE POSITIONS LORAIN 4317-012	5920-00-156-3681	EA
24415F	FILTER, DECENTRALIZING, 50A, LORAIN 4826-065	NSNR	EA
24411B	FILTER, DECENTRALIZING 100A, LORAIN 4826-084	NSNR	EA
22111A	ELECTROLYTE, 15-GAL CONTAINER, 1.400 S.G.	NSNR	EA
22112B	ELECTROLYTE, 5-GAL CONTAINER, 1.400 S.G.	NSNR	EA
24893Z	CIRCUIT BREAKER ENCL, E/W 2-100A MAIN 2-15A, 2-10A, AND 26-5A DC BREAKERS, CURTIS 271C7	NSNR	EA
21786F	CABINET BASE, PAR-METAL CB-1931	NSNR	EA
21661B	CABINET, EOPT, 19" MTG, PAR-METAL PC-8413	NSNR	EA
24816A	BATTERY RACK, 2-STEP, SEISMIC ZONE 4, RESTRAINTS, EXIDE 84012	NSNR	EA
24815Z	BATTERY RACK, 2-STEP, SEISMIC ZONE 4, RESTRAINTS, EXIDE 84010	NSNR	EA
24814W	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3, RESTRAINTS, EXIDE 84045	NSNR	EA
24813H	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3, RESTRAINTS, EXIDE 84043	NSNR	EA
24812G	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, EXIDE 84569-108	NSNR	EA
24811F	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, EXIDE 84568-96	NSNR	EA
24810A	BATTERY RACK, 2-STEP, SEISMIC ZONE 4, RESTRAINTS, EXIDE 83994	NSNR	EA
24809E	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3, RESTRAINTS, EXIDE 84027	NSNR	EA
24808B	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, EXIDE 84563-168	NSNR	EA
24807C	BATTERY RACK, 2-STEP, SEISMIC ZONE 4, RESTRAINTS, EXIDE 83988	NSNR	EA
24806B	BATTERY RACK, 2-STEP, SEISMIC ZONES 2 AND 3, RESTRAINTS, EXIDE 84021	NSNR	EA
24805A	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, EXIDE 84557-96	NSNR	EA
24804Z	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074526-666	NSNR	EA
24803W	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, GOULD 507-074526-333	NSNR	EA
24802H	BATTERY RACK, 2-STEP, SEISMIC ZONES 2, 3 AND 4 RESTRAINTS, GOULD 507-074517-666	NSNR	EA
24801G	BATTERY RACK, 2-STEP, SEISMIC ZONE 1, RESTRAINTS, GOULD 507-074517-333	NSNR	EA
24800F	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-939-20-EPII	NSNR	EA
24499B	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-939-20-EPI	NSNR	EA
24498A	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-15-EPII	NSNR	EA
24497Z	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-15-EPI	NSNR	EA
24496J	BATTERY RACK, 2-STEP, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-903-9-EPII	NSNR	EA
24495K	BATTERY RACK, 2-STEP, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-903-9-EPI	NSNR	EA
24494L	BATTERY RACK, 2-STEP, EXIDE 84569-108	NSNR	EA
24493M	BATTERY RACK, 2-STEP, EXIDE 84568-96	NSNR	EA
24492N	BATTERY RACK, 2-STEP, EXIDE 84563-168	NSNR	EA
24491Y	BATTERY RACK, 2-STEP, EXIDE 84557-96	NSNR	EA
10734H	BATTERY RACK, 2-STEP, GOULD 507-074526	NSNR	EA
24490P	BATTERY RACK, 2-STEP, GOULD 507-074517	NSNR	EA

LIST OF MATERIALS

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
42	24489K	BATTERY RACK, 2-STEP, C & D RD-903-15	NSNR	EA
41	24866F	BATTERY RACK, 2-STEP, C & D RD-903-9	NSNR	EA
40	24487A	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-074488-333	NSNR	EA
39	24486Z	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3 AND 4 RESTRAINTS, GOULD 507-074479-666	NSNR	EA
38	23172N	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, GOULD 507-74479-333	NSNR	EA
37	24485J	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-616-20-EPII	NSNR	EA
36	24484X	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-616-20-EPI	NSNR	EA
35	24483L	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-15-EPII	NSNR	EA
34	24482M	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-15-EPI	NSNR	EA
33	24481N	BATTERY RACK, 2-TIER, SEISMIC ZONES 3 AND 4 RESTRAINTS, C & D RD-901-9-EPII	NSNR	EA
32	24480Y	BATTERY RACK, 2-TIER, SEISMIC ZONES 1 AND 2 RESTRAINTS, C & D RD-901-9-EPI	NSNR	EA
31	24479O	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84767-120	NSNR	EA
30	24478C	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84800-120	NSNR	EA
29	24477B	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84542-84	NSNR	EA
28	24476A	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84765-96	NSNR	EA
27	24475Z	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84798-96	NSNR	EA
26	24474J	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84540-60	NSNR	EA
25	24473K	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84760-168	NSNR	EA
24	24472L	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84793-168	NSNR	EA
23	24471M	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84539-84	NSNR	EA
22	24470N	BATTERY RACK, 2-TIER, SEISMIC ZONE 4 RESTRAINTS, EXIDE 84754-96	NSNR	EA
21	24469E	BATTERY RACK, 2-TIER, SEISMIC ZONES 2 AND 3 RESTRAINTS, EXIDE 84787-96	NSNR	EA
20	24468D	BATTERY RACK, 2-TIER, SEISMIC ZONE 1 RESTRAINTS, EXIDE 84844-96	NSNR	EA
19	24467C	BATTERY RACK, 2-TIER, SEISMIC ZONES 2, 3, AND 4 RESTRAINTS, GOULD 507-074488-666	NSNR	EA
18	24466B	BATTERY RACK, 2-TIER, EXIDE 84542-84	NSNR	EA
17	24465A	BATTERY RACK, 2-TIER, EXIDE 84540-60	NSNR	EA
16	24464W	BATTERY RACK, 2-TIER, EXIDE 84539-84	NSNR	EA
15	24463J	BATTERY RACK, 2-TIER, EXIDE 84844-96	NSNR	EA
14	24462K	BATTERY RACK, 2-TIER, GOULD 507-074488	NSNR	EA
13	24461L	BATTERY RACK, 2-TIER, GOULD 507-074479	NSNR	EA
12	24460M	BATTERY RACK, 2-TIER, C & D RD-901-20	NSNR	EA
11	24459F	BATTERY RACK, 2-TIER, C & D RD-901-15	NSNR	EA
10	18132P	BATTERY RACK, 2-TIER, C & D RD-901-9	NSNR	EA
9	24458E	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 3260 AH, EXIDE GC-35	NSNR	EA
8	24457D	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 3300 AH, C & D MCT-3300	NSNR	EA
7	24456C	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 1650 AH, GOULD NCX-1650	NSNR	EA
6	24455B	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 2160 AH, EXIDE GC-25	NSNR	EA
5	24454A	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 2016 AH, C & D LCT-2016	NSNR	EA
4	24453Z	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 1950 AH, GOULD NCX-1950	NSNR	EA
3	24452J	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 1020 AH, EXIDE GC-11	NSNR	EA
2	24451K	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 1008 AH, C & D LCT-1008	NSNR	EA
1	24450H	BATTERY BANK, LEAD/CALCIUM-ACID, 26-CELL, 900 AH, GOULD NCX-900	NSNR	EA

ITEM	SML	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
IDENT NO		ORGANIZATION			
STD-MS-0021		US ARMY COMMUNICATIONS-ELECTRONICS			
SHEET 1 OF 26		ENGINEERING INSTALLATION AGENCY			
DESIGN BY	DATE	48V DC, 400 A			
S FENSEL	APR 79	END CELL BATTERY FACILITY			
DRAWN BY	DATE				
S D H	APR 79				
CHECKED BY	DATE				
F MYERS	APR 79				
APPROVAL	ACTIVITY	SIZE	PSCH NO	DRAWING NO.	
H M Soler	CCC-CEB-SEP	D	50470		
PROJECT	SCALE	NONE	SHEET OF		

D

C

B

A

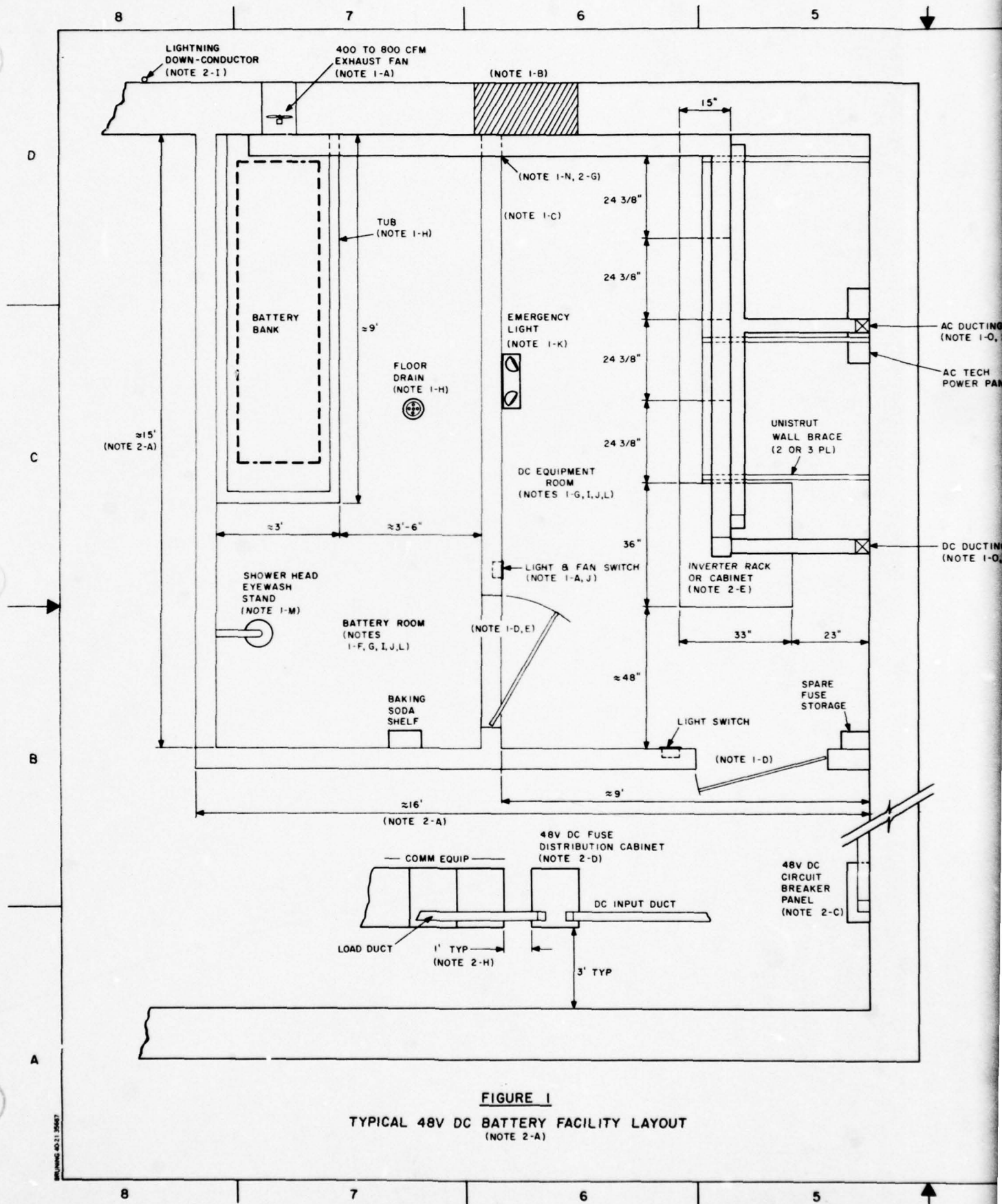


FIGURE 1
TYPICAL 48V DC BATTERY FACILITY LAYOUT
 (NOTE 2-A)

REPLACES 40-21 25007

4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

1. FACILITY ENGINEER NOTES:

- A. PROVIDE AND INSTALL A 400- TO 800-CFM, ELECTRIC, SPARK-PROOF EXHAUST FAN IN THE BATTERY ROOM WITH ON/OFF SWITCH LOCATED OUTSIDE NEAR THE BATTERY ROOM ENTRANCE DOOR.
- B. WALL IN UNNECESSARY DOOR, WINDOW, OR OTHER OPENINGS WITH MASONRY.
- C. ERECT A PERMANENT PARTITION OR WALL FROM FLOOR TO CEILING.
- D. PROVIDE AND INSTALL AN ENTRANCE DOOR - 3'-3" WIDE AND 6'-3" HIGH WITH LOCKING DEVICE ON THE DC EQUIPMENT ROOM DOOR.
- E. PROVIDE A 1" OR HIGHER DOOR SILL TO CONTAIN LIQUIDS WITHIN THE BATTERY ROOM.
- F. REMOVE ANY EXISTING NORMAL LIGHTING FIXTURES, SWITCHES, ELECTRICAL OUTLETS, AND UNUSED ELECTRICAL WIRING IN THE PROPOSED BATTERY ROOM.
- G. REMOVE ANY UNNECESSARY HEATERS AND PLUMBING.
- H. IF A FLOOR DRAIN IS USED IN THE BATTERY ROOM, PROVIDE A LEVEL AREA (+4/8") FOR THE BATTERY BANK. SLOPE THE REMAINING FLOOR AREA TO THE DRAIN. THE DRAIN SHOULD BE ROUTED TO AN ACID CATCH BASIN WHERE ACID CAN BE NEUTRALIZED AND DRAINED OR PUMPED INTO THE SEWER NETWORK IN CASE OF LARGE SPILLS. IF A DRAIN CANNOT BE USED, AN ACID-PROOF TUB (CONCRETE OR OTHER) MUST BE PROVIDED UNDER THE BATTERY RACK TO CONTAIN POTENTIAL SPILLS. (SEE SHEET 4, TABLE 2, FOR BATTERY RACK DIMENSIONS.)
- I. PATCH ANY HOLES AND PAINT THE TUB, WALLS (TO A HEIGHT OF 5'), AND FLOOR WITH AN ACID-RESISTANT COATING. PAINT THE REMAINING WALL AND CEILING TO MATCH THE OTHER AREAS. PATCH AND PAINT THE DC EQUIPMENT ROOM TO MATCH.
- J. PROVIDE AND INSTALL SPARK-PROOF LIGHTING FIXTURES IN THE BATTERY ROOM WITH THE ON/OFF SWITCH LOCATED OUTSIDE THE BATTERY ROOM DOOR. MINIMUM ILLUMINATION SHOULD BE 30 FOOT-CANDLES 3 FEET ABOVE THE FLOOR. PROVIDE AND INSTALL FLUORESCENT LIGHT FIXTURES IN THE DC EQUIPMENT ROOM. REQUIRED ILLUMINATION IS - 50 FOOT-CANDLES 3 FEET ABOVE THE FLOOR.
- K. PROVIDE AND INSTALL AUTOMATIC EMERGENCY LIGHTING TO ILLUMINATE THE DC EQUIPMENT RACK FRONTS AND DOOR DURING AC POWER FAILURES.
- L. PROVIDE LONG-TERM ENVIRONMENTAL CONTROL TO KEEP THE BATTERY AND DC EQUIPMENT ROOMS BETWEEN 60°F (15.6°C) AND 85°F (29.4°C) AND A RELATIVE HUMIDITY RANGE OF 20 TO 60 PERCENT. OCCASIONAL TEMPERATURE AND HUMIDITY VARIATIONS ABOVE AND BELOW THE ABOVE LIMITS ARE PERMISSIBLE.

- M. PROVIDE AND INSTALL A COLD WATER DELUGE SHOWER HEAD AND EYEWASH STAND.
- N. PROVIDE AN OPENING FOR THE DC POWER DUCT BETWEEN THE DC EQUIPMENT AND BATTERY ROOMS.
- O. PROVIDE OPENINGS IN THE CEILING/WALL FOR THE AC AND DC POWER DUCTS BETWEEN THE DC POWER AND COMMUNICATIONS EQUIPMENT.

2. COMMUNICATIONS ENGINEER NOTES:

- A. THIS LAYOUT IS TYPICAL FOR A BATTERY FACILITY LOCATION ON THE SAME FLOOR BELOW THE COMMUNICATIONS EQUIPMENT ROOM, SUCH AS A BASEMENT.
- B. FOR RELATIVELY SHORT DISTANCES TO THE COMMUNICATIONS EQUIPMENT (< 75'), LOCAL DISTRIBUTION IN THE DC EQUIPMENT ROOM CAN BE USED FOR LOCATIONS ON THE SAME FLOOR; SEE SHEETS 3 AND 17.
- C. FOR LONGER DISTANCES OR SEPARATE LOCATIONS AND MODERATE DISTRIBUTION REQUIREMENTS, THE WALL-MOUNTED CIRCUIT BREAKER ARRANGEMENT IS RECOMMENDED, ESPECIALLY IF FLOOR SPACE IS MINIMUM; SEE SHEETS 9 AND 18. SEVERAL PANELS CAN BE USED, LOCATED NEAR THE LOADS.
- D. THE SEPARATE FUSE DISTRIBUTION CABINET IS RECOMMENDED FOR LARGE DISTRIBUTION REQUIREMENTS IN SEPARATE LOCATIONS, OVER 80 FEET AWAY. THE DISTRIBUTION CABINET SHOULD BE PLACED NEAR THE COMMUNICATIONS EQUIPMENT TO MINIMIZE WIRE LENGTHS. SEE SHEETS 5 AND 19.
- E. AN INVERTER FROM 0.5 TO 10 KVA CAN BE INSTALLED TO PROVIDE 120-V AC, 1ø, 50/60 HZ POWER FOR CRITICAL AC-POWERED EQUIPMENT.
- F. THE DUCTS BETWEEN THE BATTERY FACILITY AND COMMUNICATIONS EQUIPMENT SHOULD CONTAIN AN INSULATING COUPLING NEAR THE PENETRATIONS IN THE DC EQUIPMENT ROOM TO PREVENT ELECTRICAL NOISE FROM THE DC POWER RACKS FROM BEING CONDUCTED TO THE COMMUNICATIONS EQUIPMENT ALONG THE METAL DUCTS.
- G. AFTER ALL CABLES ARE INSTALLED, SEAL THE INSIDE OF THE DC DUCT AT THE PENETRATION BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS WITH NONHARDENING SEALER TO PREVENT CONDUCTION OF GASES TO THE DC EQUIPMENT RACKS.
- H. IF THE DC DISTRIBUTION CABINET CONTAINS DC-TO-DC CONVERTERS, AN INVERTER, OR OTHER ELECTRICALLY NOISY EQUIPMENT, SEPARATE THE CABINET FROM THE COMMUNICATIONS EQUIPMENT AS SHOWN, AND INSULATE THE OUTPUT (LOAD) DUCT AT THE CABINET TO PREVENT CONDUCTION OF NOISE TO THE COMMUNICATIONS EQUIPMENT. IF THIS CABINET CONTAINS AN AC OUTLET, USE NONMETALLIC CONDUIT FOR CONNECTION TO THE AC POWER DUCT.
- I. GROUND THE BATTERY RACK ONLY IF LOCATED WITHIN 6 FEET OF A LIGHTNING DOWN-CONDUCTOR.

IDENT NO. STD-MS-0021		SIZE D	PSCH NO. 50470	DRAWING NO.
SHEET 2 OF 28				
DRAWN BY S.D.H.				
APPROVED <i>[Signature]</i>	SCALE NONE	SHEET 2 OF 28		

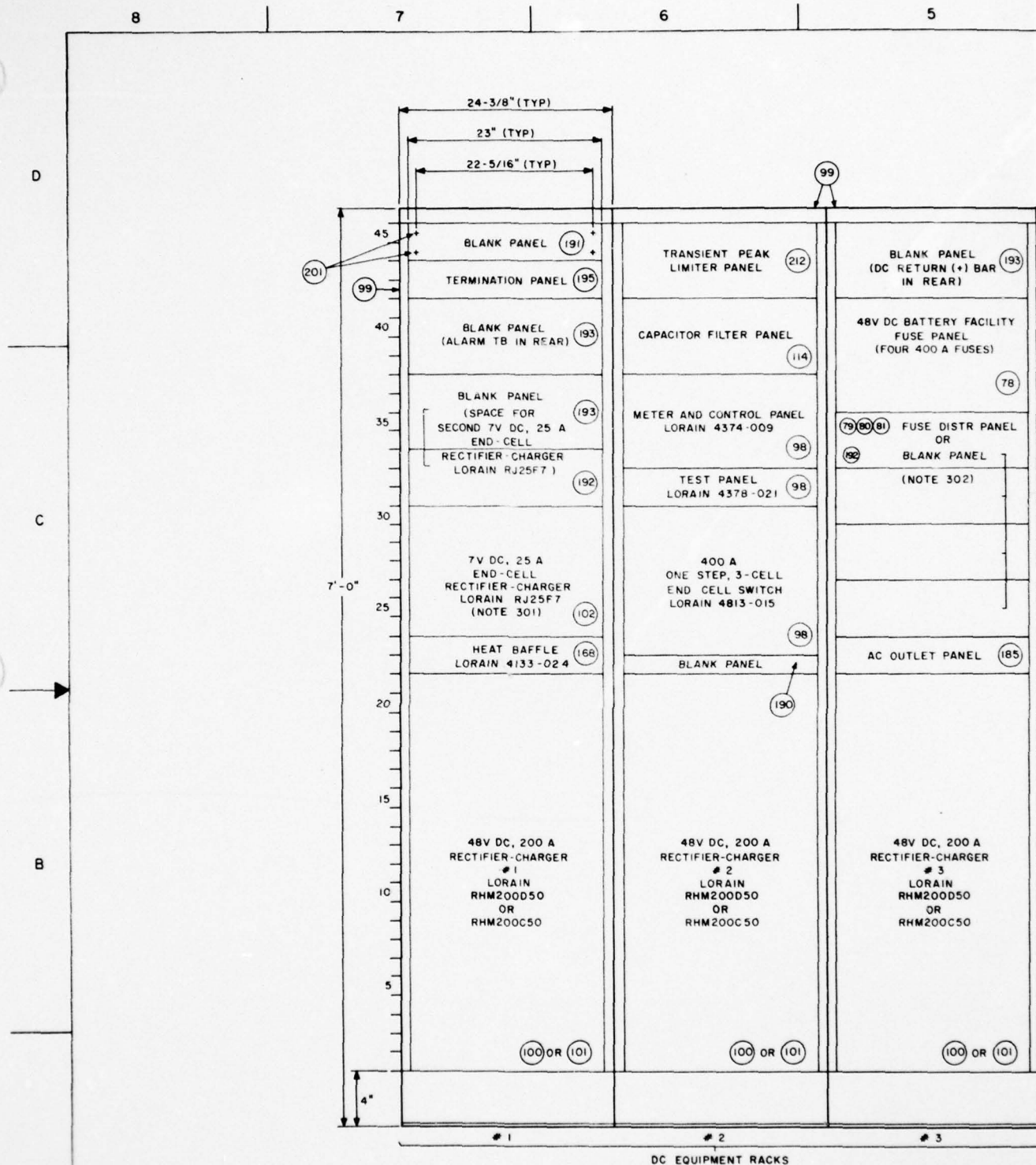


FIGURE 2
DC PWR EQPT RACK FACE LAYOUT
 (INSTALL IN DC EQUIPMENT ROOM)

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

1. GENERAL ENGINEER NOTES:

- A. THE RACK LINEUP SHOULD BE OPTIMIZED FOR THE PARTICULAR APPLICATION. RACKS SHOULD BE EASILY ACCESSIBLE FOR MAINTENANCE. RACKS SHOULD ALSO BE PLACED FOR MINIMUM AVERAGE CABLE LENGTHS TO ALL CONNECTED EQUIPMENT.
- B. SPACE IS REQUIRED IN BACK OF ALL EQUIPMENT RACKS. MINIMUM CLEARANCE IS 24 INCHES. DESIRABLE DISTANCE IS 36 INCHES OR GREATER.
- C. ONE SIDE OF THE EQUIPMENT LINEUP CAN BE PLACED AGAINST A WALL OR OTHER EQUIPMENT. IF PLACED AGAINST A WALL, ALLOW A MINIMUM OF 4 INCHES OF CLEARANCE.

2. GENERAL INSTALLER NOTES:

A. RECTIFIER-CHARGER AND CONTROL RACK INSTALLATION STEPS.

- (1) INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE.
- (2) LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
- (3) DETERMINE FLOOR POSITION AND BOLT THE RECTIFIER-CHARGER AND CONTROL RACKS TO THE FLOOR.
- (4) BOLT THE RACKS TOGETHER NEAR THE TOP.
- (5) INSTALL THE RECTIFIER-CHARGER IN RACKS 1, 2, AND 3.
- (6) ASSEMBLE THE REMOTE CABINETS AND INVERTER RACK AS SHOWN IN FIGURES 5, 6, AND 7.
- (7) INSTALL THE AC AND DC POWER DUCTS OVER THE RACKS AND INTO THE BATTERY ROOM.
- (8) INSTALL DC POWER CABLES UP TO THE BATTERY TERMINALS, BUT DO NOT CONNECT TO THE BATTERY AT THIS TIME. (TAPE THE ENDS OF THE CABLES TO PREVENT ACCIDENTAL CONTACT.)
- (9) INSTALL AC AND REMAINING DC POWER CABLES.
- (10) COMPLETE WIRING OF THE RECTIFIER-CHARGER AND CONTROL RACKS.
- (11) AFTER ALL CABLES ARE INSTALLED, PROVIDE A BARRIER INSIDE THE DUCT WHERE IT CROSSES BETWEEN THE BATTERY AND DC EQUIPMENT ROOMS.

- B. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH SECTION 7 OF THIS SEIP.

NOTE:

301. TWO 25A END CELL RECTIFIER-CHARGERS ARE RECOMMENDED FOR THE 8-HOUR BATTERY BANK FACILITY AND FOR OVERSEAS APPLICATIONS IN ISOLATED AREAS.
302. SELECT THE APPROPRIATE FUSE PANELS FOR LOCAL DISTRIBUTION. SEE SHEET 17. COVER UNUSED RACK SPACE WITH BLANK PANELS. REFER TO SHEETS 9 AND 18 FOR THE WALL-MOUNTED CIRCUIT BREAKER PANEL DISTRIBUTION. SHOWN ON SHEETS 8 AND 19 IS THE REMOTE CABINET DISTRIBUTION ARRANGEMENT.

PROJECT NO. STD-MS-0021		SIZE FROM NO. D 50470		DRAWING NO.	
SHEET 3 OF 26		SCALE NONE		SHEET OF	
DRAWN BY S. D. M.		APPROVED <i>[Signature]</i>			

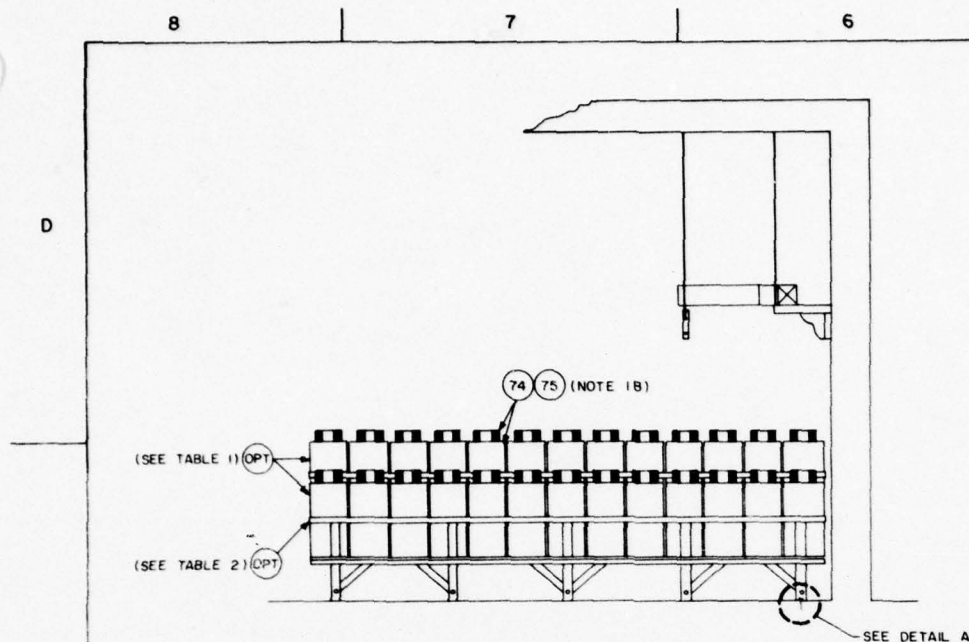


FIGURE 3
TYPICAL BATTERY & RACK INSTALLATION
(NOTE 1A)

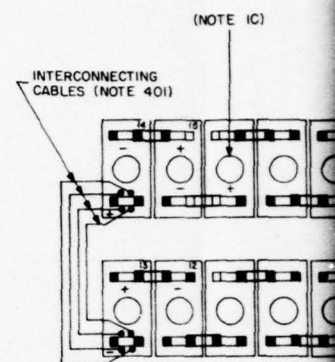
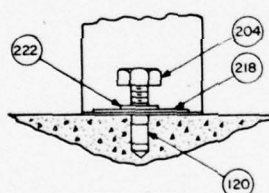
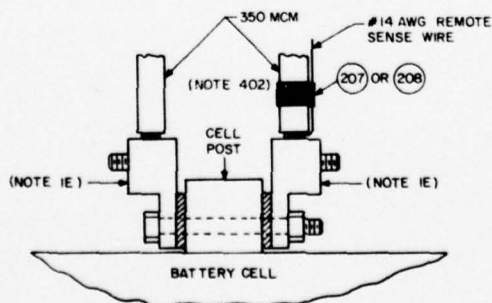


FIGURE 4
TYPICAL BATTERY INTERCONNECTION



DETAIL A
BATTERY RACK TO CONCRETE FLOOR MOUNTING



DETAIL B
BATTERY POST CONNECTOR
INSTALLATION

TABLE 1

BATTERY CAPACITY AND CELL TYPE				
REQUIRED FULL LOAD BATTERY POWER, HOURS	REQUIRED AMPERE- HOURS	CELL TYPE (NOTE 1D)		
		C&D	GOULD	EXIDE
1	400 # 1-HR RATE	LCT-1008	NCX-900	GC-11 (1020 AH)
4	1600 # 4-HR RATE	LCT-2016	NCX-1950	GC-25 (2160 AH)
8	3200 # 8-HR RATE	MCT-3300	NCX-1650 (2 TIMES)	GC-35 (3260 AH)

		TWO-STEP RACK			
MAKE	BATTERY CELL	BASIC NUMBER	SEISMIC ZONES (NOTE 1A)		
			1	2	3&4
C&D	LCT-1008	RD-903-9	-EPI	-EPI	-EPII
	LCT-2016	RD-903-15	-EPI	-EPI	-EPII
	MCT-3300	-	-	-	-
GOULD	NCX-900	S07-074517	-333	-666	-666
	NCX-1950	S07-074526	-333	-666	-666
	2 NCX-1650	(2) S07-074526	-333	-666	-666
EXIDE			1	2&3	4
	2GC-11	84557-96	84557-96	84021-96	83988
	GC-25	84563-168	84563-168	84027-168	83994
	GC-35	(1) 84568-96 (1) 84569-108	(1) 84568-96 (1) 84569-108	84043-96 84045-108	84018 84018

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

1. GENERAL ENGINEER NOTES:

- TWO-STEP BATTERY RACK PERMITS EASIER MAINTENANCE BUT REQUIRES GREATER DEPTH. WHERE THE BATTERY ROOM IS NARROW, A TWO-TIER RACK MAY BE PREFERRED. SEE TABLE 2 FOR BATTERY RACK DIMENSIONS. REFER TO DRAWING STD-MS-0025 TO DETERMINE SHOCK PROTECTION REQUIREMENTS FOR BATTERY RACKS. ADD SUFFIXES SHOWN IN THE SEISMIC ZONE COLUMNS TO THE BASIC RACK NUMBER FOR C & D AND GOULD RACKS. ORDER RACK NUMBERS SHOWN IN SEISMIC ZONE COLUMN FOR EXIDE RACKS. (NOTE THAT EXIDE BATTERY RACKS FOR ZONES 2 & 3 ARE IN COLUMN 2. ZONE 4 RACKS ARE IN COLUMN 3.)
- FOR CONUS INSTALLATION, CELLS SHOULD BE SHIPPED WET, FILLED WITH THE PROPER ELECTROLYTE FROM THE MANUFACTURER'S PLANT. FOR OVERSEAS SHIPMENT, CELLS SHOULD BE SHIPPED DRY-CHARGED, TO BE FILLED WITH ELECTROLYTE AFTER INSTALLATION.
- ALL CELLS SHOULD BE EQUIPPED WITH DIFFUSER VENTS. ORDER THEM SEPARATELY IF NOT FURNISHED AS PART OF EACH CELL. SEE TABLE 2.
- BASED ON A MINIMUM BATTERY TERMINAL VOLTAGE OF 45.5 V (44.0 MIN FOR EQUIP AND 1.5 TOTAL LINE DROP).
- ORDER THE SIX 350 MCM LEAD-PLATED COPPER TERMINAL LUGS AS PART OF THE BATTERY PACKAGE.
- BATTERY RACK DIMENSIONS ARE WITHOUT SEISMIC BRACING. ALLOW APPROXIMATELY 2" ADDITIONAL WIDTH FOR TWO-TIER AND 10" ADDITIONAL WIDTH FOR TWO-STEP RACKS WITH SEISMIC BRACING. (NOTE THAT THE LENGTH OF SOME EXIDE RACKS IS INCREASED FOR SEISMIC ZONES 2, 3, AND 4. THE RACK LENGTH IS PROVIDED IN INCHES FOLLOWING THE PART NUMBER AND DASH.)

2. GENERAL INSTALLER NOTES:

A. BATTERY BANK INSTALLATION STEPS:

- INVENTORY MATERIAL AND EQUIPMENT AND INSPECT FOR DAMAGE. LAY OUT EQUIPMENT FLOOR AND ESTABLISH REFERENCE WORKING LINES AND LOCATION POINTS.
- ASSEMBLE THE BATTERY RACK AND ANCHOR TO THE FLOOR. THE FLOOR SPACE FOR THE BATTERY BANK SHOULD BE LEVEL. IF THIS IS NOT THE CASE, USE STEEL FLAT WASHERS UNDER THE BATTERY RACK LEGS TO LEVEL THE BATTERY RACK PRIOR TO INSTALLING THE CELLS.
- BEFORE PROCEEDING WITH THE UNPACKING, HANDLING, INSTALLATION, AND OPERATION OF THE LEAD-ACID CELLS, REVIEW THE SAFETY PRECAUTIONS LISTED IN THE MANUFACTURER'S MANUAL.
- EXAMINE ALL CELLS FOR CONCEALED DAMAGE.
- PLACE CELLS ON BATTERY RACK AND INSTALL CELL TERMINAL HARDWARE.
- ELECTROLYTE IS SHIPPED IN CONCENTRATED FORM AND MUST BE DILUTED WITH DISTILLED WATER PRIOR TO USE IN THE CELLS. USE OF CONCENTRATED (HIGH SPECIFIC GRAVITY) ACID WILL DAMAGE THE CELL. INITIAL FILLING OF CELLS SHALL BE DONE WITH ELECTROLYTE HAVING A SPECIFIC GRAVITY BETWEEN 1.203 AND 1.206.

- PRIOR TO REMOVING BATTERY CAPS, PREPARE ENOUGH ELECTROLYTE TO FILL SEVERAL CELLS. SINCE ADDITION OF CONCENTRATED SULFURIC ACID TO WATER GENERATES HEAT, THE ELECTROLYTE MUST BE PREPARED IN ADVANCE TO ALLOW TIME FOR COOLING. THE ELECTROLYTE SHOULD NOT BE HOTTER THAN 90°F WHEN POURED INTO THE CELLS.

CAUTION: ALWAYS POUR ACID INTO WATER--NEVER WATER INTO ACID. POUR ACID SLOWLY, SINCE FAST POURING WILL GENERATE ENOUGH HEAT TO INDUCE VIOLENT BOILING. WEAR RUBBER GLOVES, RUBBER APRON, AND GOGGLES WHILE PREPARING ELECTROLYTE AND FILLING CELLS.

- AFTER UNPACKING THE DIFFUSER VENT CAPS AND PREPARING CELLS FOR RECEIPT OF ELECTROLYTE, FILL THE CELLS WITH ELECTROLYTE TO THE MIDDLE LEVEL MARKED ON THE PLASTIC JARS. (THIS WILL ALLOW SOME SPACE FOR SLIGHT ADJUSTMENTS IN SPECIFIC GRAVITY LATER.)
- CHECK THE SPECIFIC GRAVITY AT ROOM TEMPERATURE AND ADJUST TO 1.205 IF NECESSARY.

- INSTALLERS MUST TAKE SPECIAL CARE NOT TO CUT OR ABRASE THE DC CABLE INSULATION DURING INSTALLATION IN THE DUCTS BETWEEN THE BATTERY BANK AND DC EQUIPMENT RACKS.

TABLE 2

BATTERY BANK DATA

BATTERY BANK DATA													
				TWO-TIER RACK									
384	DIMENSIONS			BASIC NUMBER	SEISMIC ZONES (NOTE 1A)		384	DIMENSIONS			CONTAINERS OF ELECTROLYTE		DIFFUSER VENT NO.
	L	W	H		1	2		L	W	H	15 GAL	5 GAL	
-EPII	9"	30"	29.69"	RD-901-9	-EPI	-EPI	-EPII	9"	20.31"	42.69	10	3	PV-223
-EPII	15"	30"	29.69"	RD-901-15	-EPI	-EPI	-EPII	15"	20.31"	42.69"	17	2	PV-223
-	-	-	-	RD-616-20	-EPI	-EPI	-EPII	18"11"	24.5"	48"	29	2	PV-385
-666	8'6"	30.75"	23.75"	507-074479	-333	-666	-666	8'6"	19.75"	41.25"	8	3	W03-104881
-666	13'	30.75"	23.75"	507-074488	-333	-666	-666	13'	19.75"	41.25"	12	2	W03-104870
-666	13'	30.75"	23.75"	(2) 507-074488	-333	-666	-666	13'	19.75"	41.25"	27	3	W03-104870
4					1	283	4						
83988-96	8"	42"	22.81"	84844-96	84844-96	84787-96	84754-96	8"	22"	54.69"	11	1	83440
83994-168	18"	42"	22.81"	(1) 84539-04 (1) 84844-96	(1) 84539-04 (1) 84844-96	84793-168	84760-168	7"	22"	54.69"	21	1	83440
84010-96 84012-108	8" 9"	45" 45"	22.81" 22.81"	(2) 84540-60 (1) 84542-04	(2) 84540-60 (1) 84542-04	84798-96 84800-120	84765-96 84767-120	5" 7"	22.5" 22.5"	54.69" 54.69"	28	-	83437

NOTES:

401. THE INTERCONNECTING CABLES AND INTERCELL STRAPS ARE PART OF THE BATTERY INTERCONNECTION KIT.

402. TO PREVENT DAMAGE TO THE BATTERY CELL POSTS, INSTALL THE 350 MCM CABLES SO THAT THEIR WEIGHT WILL BE SUPPORTED BY THE CABLE DUCT OR LADDER. IN ADDITION, FORM THE CABLES SO THAT THERE IS NO SIGNIFICANT STRESS IN ANY DIRECTION ON THE POSTS.

IDENT NO. STD-MS-0021		SIZE/PSYM NO. D 50470		DRAWING NO.	
DRAWN BY L.H. LEE		SCALE NONE		SHEET OF	
APPROVED <i>[Signature]</i>					

4

3

2

1

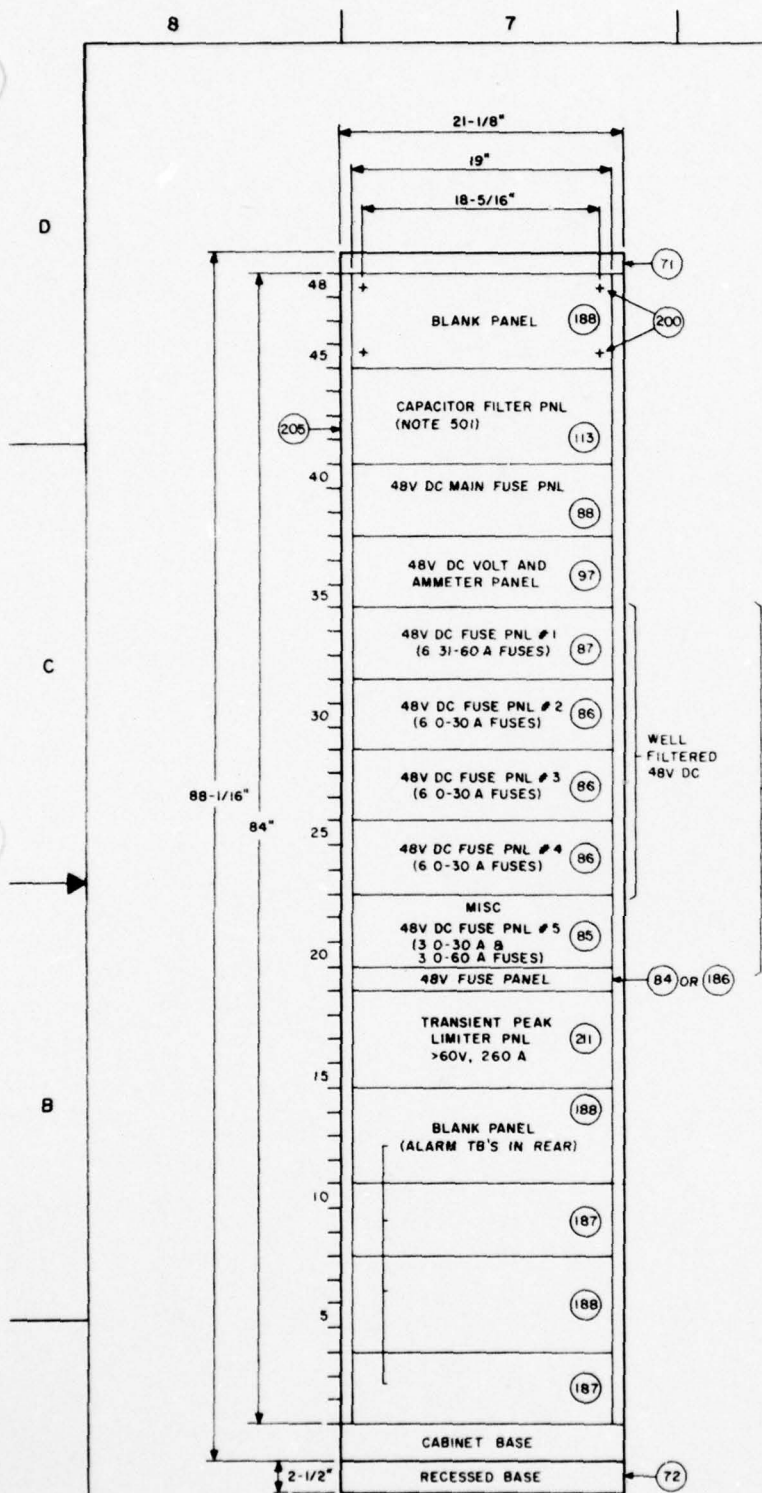


FIGURE 5
48V DC REMOTE DISTRIBUTION CABINET
(INSTALL IN COMM EQUIP ROOM)

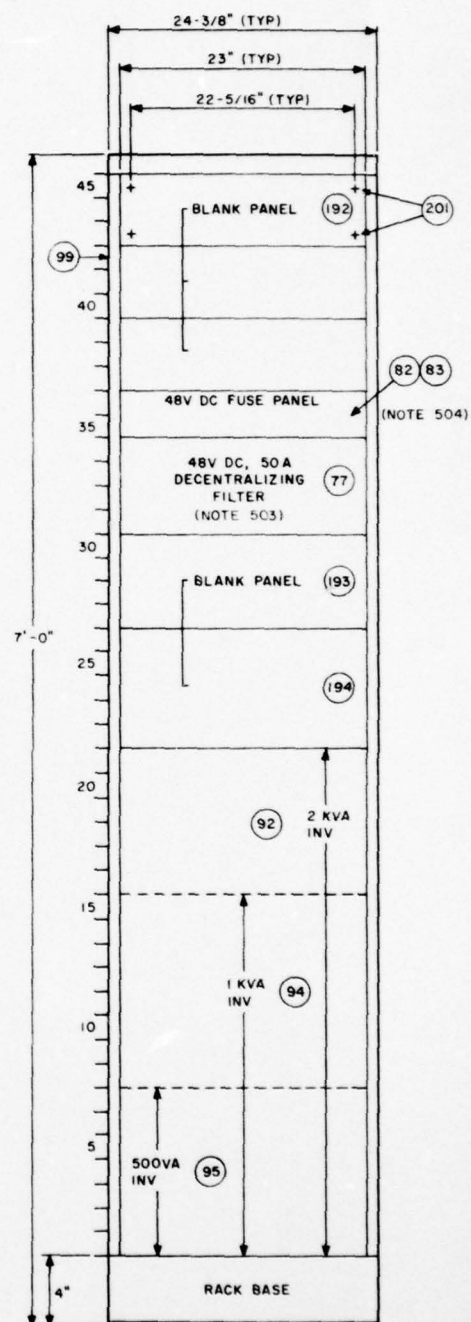
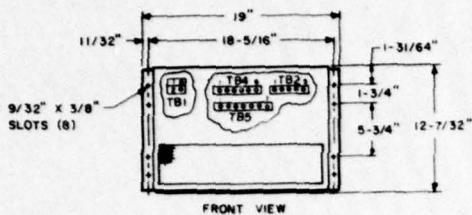
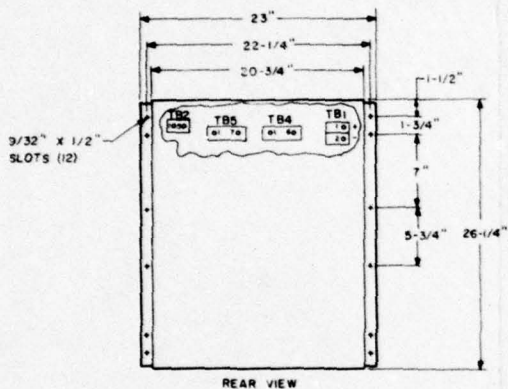


FIGURE 6
INVERTER RACK FACE LAYOUT
(INSTALL IN DC EQUIP ROOM)
(NOTE 502)



FRONT VIEW

DETAIL C
500VA, 60 HZ INVERTER DIMENSIONS
& LOCATION OF TERMINAL BOARDS



REAR VIEW

DETAIL D
1 KVA, 60 HZ INVERTER DIMENSIONS
& LOCATION OF TERMINAL BOARDS

REVISION			
ZONE	REV	DESCRIPTION	DATE

GENERAL NOTES:

- SEE SHEET 2 FOR RACK AND CABINET FLOOR POSITIONS.
 - DETERMINE CABINET BOLT-DOWN REQUIREMENTS ON A SITE-BY-SITE BASIS.
- NOTES:**
- SEE FIGURE 44, SHEET 26, FOR THE SCHEMATIC DIAGRAM AND DWG STD-MS-0003 FOR FABRICATION DETAILS.
 - ADD THIS RACK TO THE LINEUP SHOWN ON SHEET 2 IF THE INVERTER LOAD IS UP TO 0.5, 1, OR 2 KVA. FOR A GREATER INVERTER CAPACITY, SEE SHEET 6.
 - ONLY THE 1- AND 2-KVA INVERTERS REQUIRE THE DECENTRALIZING FILTER.
 - A 0-30A FUSE PANEL IS REQUIRED FOR THE 500-VA AND 1-KVA INVERTERS. THE 2-KVA INVERTER REQUIRES A 31-60A FUSE PANEL. WIRE AND FUSE THE INVERTERS AS SHOWN ON SHEET 20.
 - SUITABLE ALTERNATE INVERTERS ARE LAMARCHE ASI-500-48V (500 VA), ASI-1K-48V (1 KVA), AND ASI-2K-48V (2 KVA).

TABLE 3
LORAIN INVERTER CHARACTERISTICS (NOTE 505)

	500 VA	1 KVA	2 KVA	2 KVA
LORAIN MODEL NUMBER	WAA501B	WAA102B	WAA202B	WAG202B1
INPUT VOLTAGE, VOLTS DC	42-56	42-56	42-56	42-56
NO LOAD CURRENT, AMPS DC	3.1	6.1	11.5	10.2
FULL LOAD CURRENT, AMPS DC	13.6	26.2	51.0	52.0
OUTPUT VOLTAGE, VOLTS AC	120	120	120	120
FREQUENCY, HZ	60	60	60	50/60
EFFICIENCY, PERCENT	70	70	75	75
HEIGHT, IN	12-7/32	26-1/4	37-3/16	37-3/16
WIDTH, IN	19	23	23	20-13/16
DEPTH, IN	13	15	15	15
WEIGHT, LB	115	220	350	335
MOUNTING	RACK	RACK	RACK	FLOOR

PROJECT NO. STD-MS-0021	SIZE D 50470	DRAWING NO.
SHEET 3 OF 28	SCALE NONE	SHEET OF
DRAWN BY S. D. N.	APPROVED	

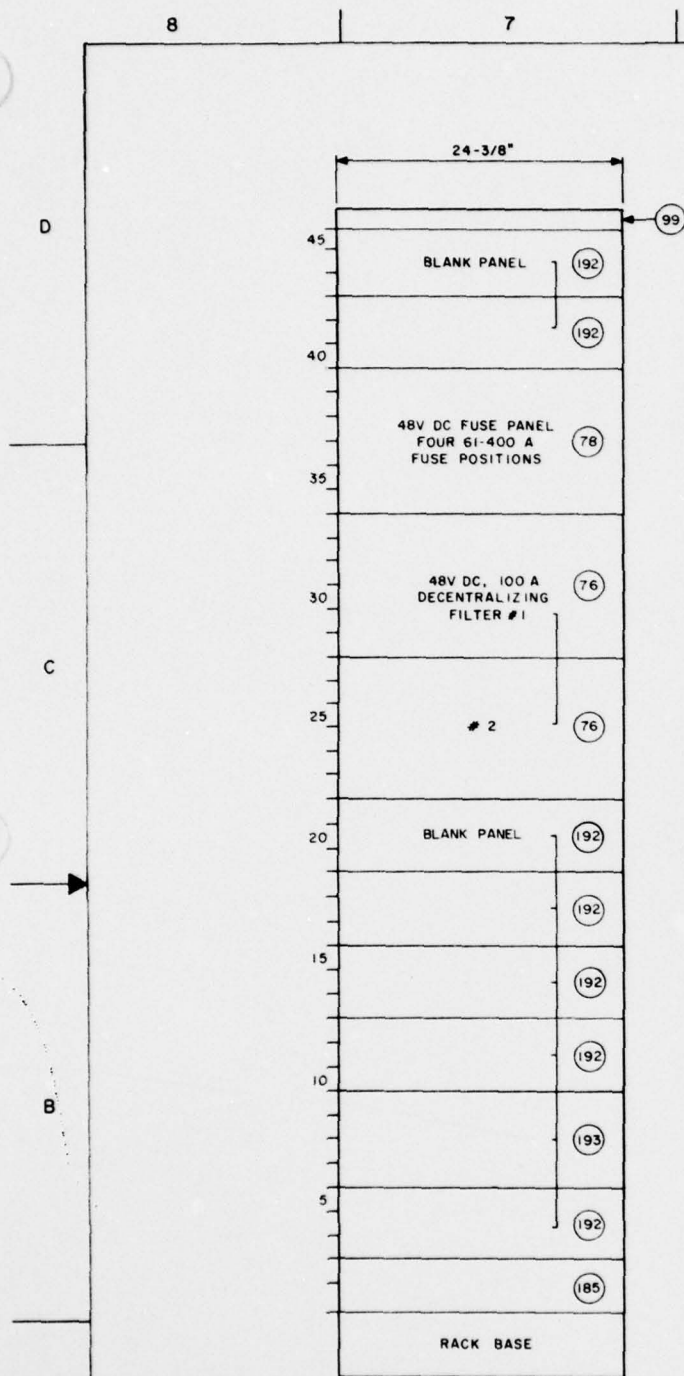


FIGURE 7
FUSE AND FILTER RACK
FACE LAYOUT
(NOTE 601)

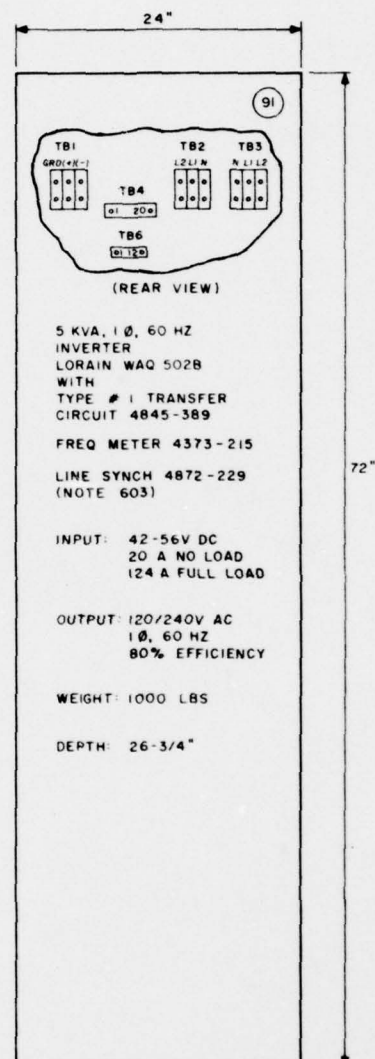


FIGURE 8
5 KVA, 60 HZ INVERTER
(NOTES 602 AND 605)

4

3

2

1

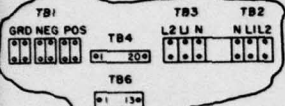
REVISION			
ZONE	REV	DESCRIPTION	DATE

36" (50 HZ)

27" (60 HZ)

(89)

(90)



(REAR VIEW)

10 KVA 1 Ø, 50 OR 60 HZ
INVERTER
LORAIN WAQ 103B (60 HZ)
WAG 103B (50 HZ)

WITH
TYPE 1 TRANSFER
CIRCUIT 4845 - 393 (60 HZ)
4845 - 424 (50 HZ)

FREQ METER:

4373 - 215 (60 HZ)
4373 - 287 (50 HZ)

LINE SYNCH 4872 - 229

(50 OR 60 HZ)
(NOTE 604)

INPUT: 42 - 56V DC
40 A NO LOAD (60 HZ)
38 A NO LOAD (50 HZ)
243 A FULL LOAD
(60 HZ)
252 A FULL LOAD
(50 HZ)

OUTPUT: 120/240V AC, 1 Ø, 60 HZ
120V AC, 1 Ø, 50 HZ
80% EFFICIENCY

WEIGHT: 1500 LBS

DEPTH: 26-3/4" (60 HZ)
32-3/4" (50 HZ)

78" (60 HZ)

84" (50 HZ)

6" BASE

NOTES:

601. THIS RACK IS REQUIRED FOR 5- AND 10-KVA INVERTER INSTALLATIONS. THE 100A DECENTRALIZING FILTERS ARE USED TO FILTER THE COMM LOAD. IF THE COMM LOAD EXCEEDS 200A, A THIRD DECENTRALIZING FILTER CAN BE ADDED.
602. THE 5- AND 10-KVA INVERTERS ARE FLOOR MOUNTED AND INSTALLED IN THE DC EQUIPMENT ROOM.
603. ORDER ONLY FOR 60-HZ SUPPLY LINES.
604. ORDER FOR 50- OR 60-HZ SUPPLY LINES.
605. SUITABLE ALTERNATE INVERTERS ARE LAMARCHE AS1-5K-48V (5 KVA) AND AS1-10K-48V (10 KVA).

D

C

B

A

FIGURE 9

10 KVA, 50 OR 60 HZ INVERTER

(NOTES 602 AND 605)

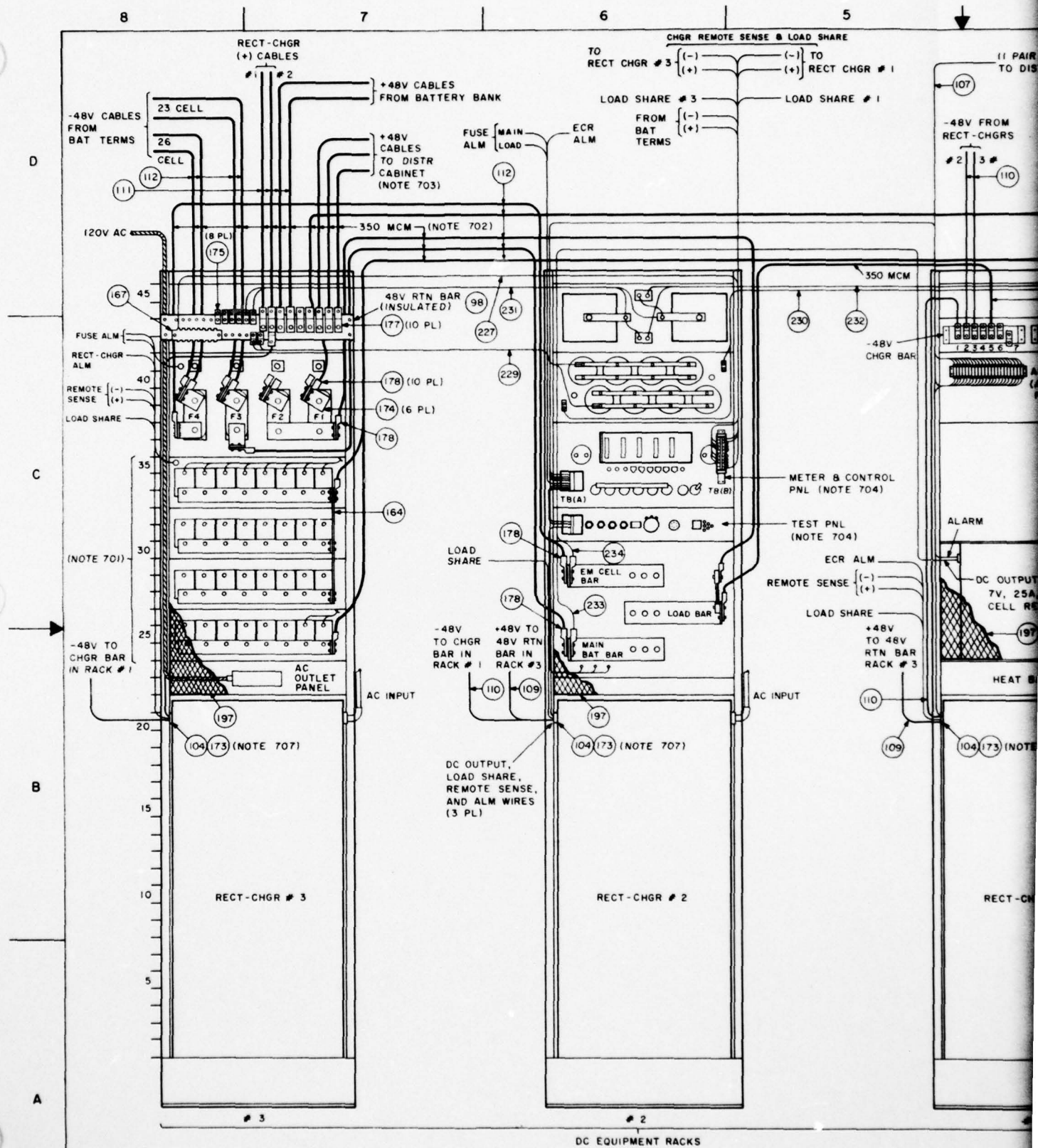
STANDARD SHEET 5 OF 25		SIZE	PSCW NO	DRAWING NO
DRAWN BY S.D.H.		D	50470	
APPROVED H. J. J. Sales		SCALE	NONE	SHEET OF

4

3

2

1



PAIR ALARM CABLE
DISTR CAB OR CDF

-48V
FEEDER CABLES
TO DISTR CAB
(NOTE 703)

(NOTE 703)

350
MCM

-48V LOAD BAR

ALM TB
(ALSO SEE
FIG 40)

AC INPUT

OUTPUT
25A, END
ALL RECT-CHGR

(197)

HEAT BAFFLE

AC INPUT

(NOTE 707)

CT-CHGR #1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

701. FUSE PANELS ARE INSTALLED AND WIRED WHEN LOCAL DISTRIBUTION IS USED. INSTALL AND WIRE PANELS TO MEET SITE REQUIREMENT. REFER TO FIGURE 11 FOR TYPICAL WIRING DETAILS.
702. OBSERVE MINIMUM BENDING RADII FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.
703. INSTALL NUMBER AND SIZE OF CABLES TO DISTRIBUTION PANELS IN RACK #3, WALL-MOUNTED DISTRIBUTION PANEL, OR DC DISTRIBUTION CABINET IN EQUIPMENT ROOM TO LIMIT VOLTAGE DROP TO 1 VOLT.
704. THE METER AND CONTROL PANEL AND THE TEST PANEL ARE SUPPLIED AND WIRED BY THE MANUFACTURER. ADDITIONAL INSTALLER WIRING IS SHOWN IN FIGURE 35.
705. FORM THE CABLE TO RELIEVE THE STRESS ON THE METER SHUNT.
706. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
707. PUNCH OUT THE 2-INCH KNOCKOUT IN THE COVER PLATE AND INSTALL THE BUSHING WITH LOCKNUT.

D

C

B

A

TO: STD-MS-0021	SIZE/TYPE/NO	DRAWING NO
SHEET 7 OF 25	D 50470	
DRAWN BY S D H	SCALE NONE	SHEET OF
APPROVED <i>H M Sch</i>		

4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

FROM
48V RTN
(+) BAR

-48V DC
FROM 400 A
MAIN FUSE

TO 5 OR
10 KVA
INVERTER

(NOTE 802)

FILTERED -48V
TO FUSE DISTR

109

112

112

ALARM
ALM TB IN
111

223

NOTES:

801. INSTALL NUMBER AND SIZE OF CABLES TO LIMIT VOLTAGE DROP TO 1 VOLT.
802. INSTALL NUMBER AND SIZE OF CABLES TO LIMIT VOLTAGE DROP TO 0.35 VOLT.
803. KEEP THE CONNECTING WIRES TO THE CAPACITOR FILTER PANEL AS SHORT AS POSSIBLE.
804. OBSERVE MINIMUM BENDING RADIUS FOR LARGE CABLES. USE CARE IN BENDING CABLES TO PREVENT DAMAGE TO CABLE INSULATION.
805. FOR 48V OPERATION REMOVE THE JUMPER WIRE ACROSS RESISTOR "F".

D

C

B

A

100 A
L-C FILTERS
FOR COMM
LOADS

FIGURE 13
FUSE & FILTER RACK WIRING -
REAR VIEW

TEST NO. STD-MS-0021		SIZE FROM NO. D 50470		DRAWING NO.	
DRAWN BY S D H.		SCALE NONE		SHEET OF	
APPROVED HMT Ska					

4

3

2

1



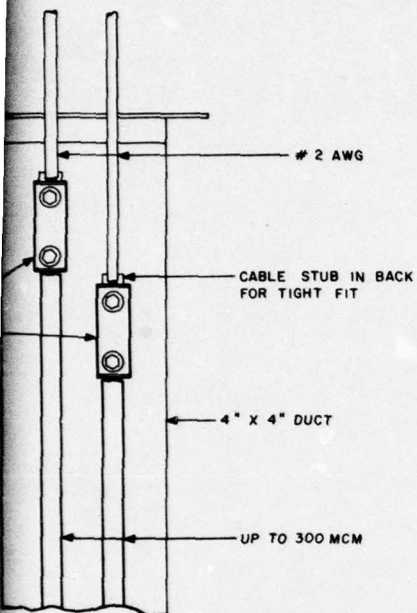
4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES:

901. MOUNT THE CIRCUIT BREAKER PANEL ON WALL OF THE COMMUNICATIONS ROOM, NEAR THE EQUIPMENT SERVED. MOUNTING HARDWARE TO BE SPECIFIED IN SITE EIP.
902. SPECIFY THE REQUIRED BREAKER SIZES.
903. THE DC POWER DUCT NETWORK INSTALLATION DETAILS ARE PART OF EACH EIP.
904. THE CB PANEL IS SHOWN WITH OPEN DOOR AND COVER REMOVED.

DETAIL E

LE SIZE REDUCING METHOD

D

C

B

A

IDENT NO STD-MS-0021	SIZE D	FSCH NO 50470	DRAWING NO
SHEET 9 OF 28	SCALE NONE	SHEET OF	
DRAWN BY S.D.H.	APPROVED <i>H.M. Saha</i>		

4

3

2

1

AD-A072 142

ARMY COMMUNICATIONS COMMAND FORT HUACHUCA AZ
STANDARD ENGINEERING INSTALLATION PACKAGE. UNINTERRUPTIBLE POWE--ETC(U)
JUL 79

F/G 9/3

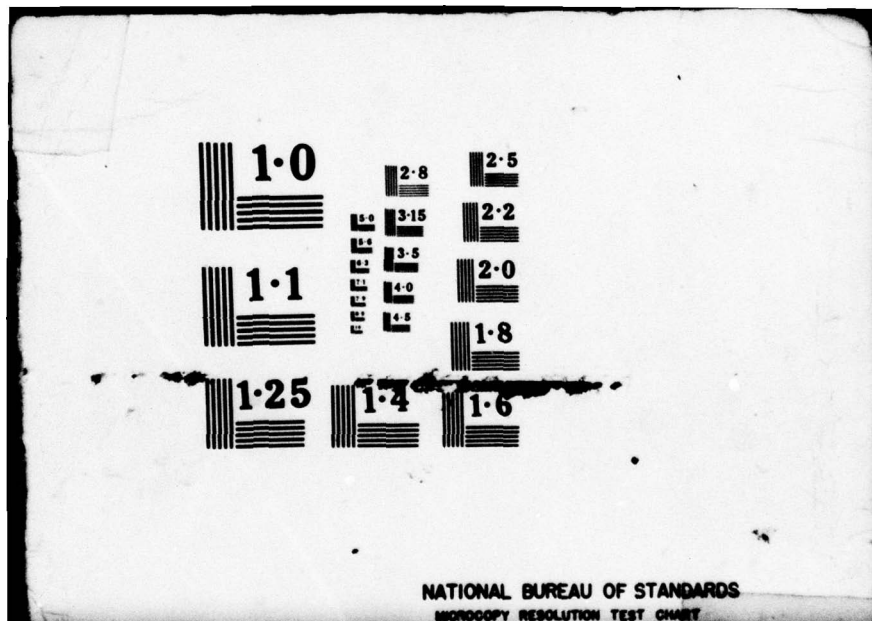
UNCLASSIFIED

ACC-SEIP-020

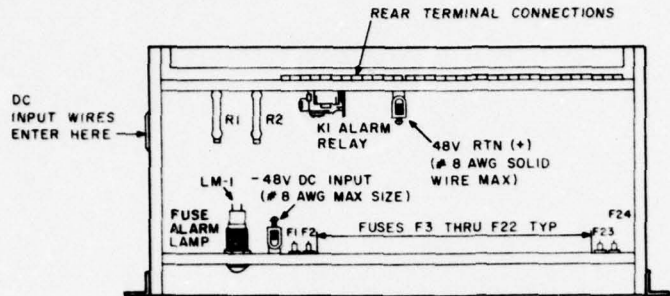
NL

3 OF 4
AD
A072142

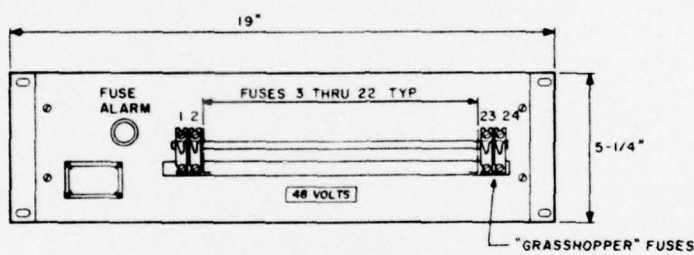




8 | 7 | 6 | 5



TOP VIEW



FRONT VIEW

FIGURE 15
SB-1523/FT FUSE PANEL LAYOUT

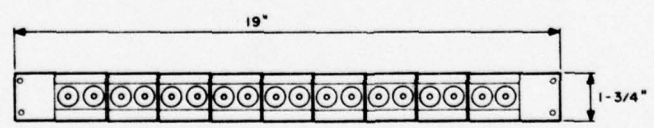


FIGURE 16
LORAIN TYPE 70 O-5A FUSE PANEL

TABLE 4
TYPE 70 FUSE DISTRIBUTION DATA TABLE

FUSE	EQUIPMENT	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN OR MFR'S NO.	TYPE
1			1-1/3	18 TO 14	WHITE	5920-00-539-6347	70
2			2	18 TO 12	ORANGE	5920-00-284-9217	70
3			3	14 TO 10	BLUE	5920-00-284-9218	70
4			5	14 TO 8	GREEN	5920-00-538-6205	70
5							
6							
7							

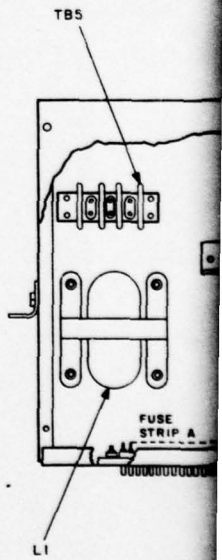
* SELECT THE WIRE SIZE BASED ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF ≤ 0.35 -V DC.

FUSE	EQUIPMENT	APPL LOAD AD
1		
2		
3		
4		
5		
6		
7		

* SELECT THE WIRE SIZE BASED ON A MAXIMUM

FUSE	EQUIPMENT	APPL LOAD AD
1		
2		
3		
4		
5		
6		

*SELECT THE WIRE SIZE BASED ON A MAXIMUM



FUSE P
(FIL

8 | 7 | 6 | 5

4

3

2

1

TABLE 5
"GRASSHOPPER" FUSE DISTRIBUTION DATA TABLE

	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	BODY COLOR	NSNR	TYPE
		1-1/3	18 TO 14	WHITE	5920-00-156-0838	35B
		2	18 TO 12	ORANGE	5920-00-556-9728	35L
		3	14 TO 10	BLUE	5920-00-156-0837	35G
		5	14 TO 8	GREEN	5920-00-122-3775	35H
		7.5	12 TO 8		5920-00-857-8418	GTE D270R7A11
		10	12 TO 6		5920-00-624-2661	BURNDY FILLOITS

ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF 0.35-V DC.

TABLE 6
GMT FUSE DISTRIBUTION DATA TABLE

	APPROX LOAD ADC	FUSE SIZE A	RECOMMENDED WIRE SIZE AWG*	PIN COLOR	NSN	TYPE
		1	18 TO 14	GRAY	5920-00-901-9936	GMT 1
		2	18 TO 12	ORANGE	5920-00-857-8933	GMT 2
		3	14 TO 10	BLUE	5920-00-081-5958	GMT 3
		3.5	14 TO 10		5920-01-056-7256	GMT 3-1/2
		5	14 TO 8	GREEN	5920-00-857-8417	GMT 5
		10	12 TO 6	RED/WHITE	NSN	GMT 10

ON A MAXIMUM VOLTAGE DROP FOR THE LOOP OF 0.35-V DC.

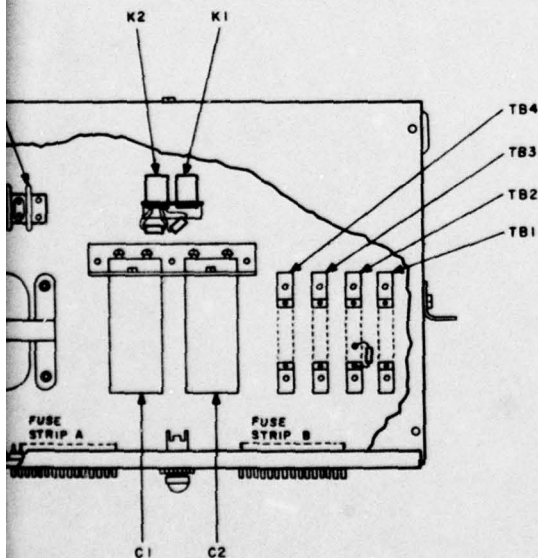


FIGURE 17
FUSE PANEL SB-3800/FTC
(FILTERED, GMT FUSES)

REVISION			
ZONE	REV	DESCRIPTION	DATE

STANDARD STD-MS-0021 SHEET 10 OF 28		ITEM FILED NO D 50470	DRAWING NO
DESIGN BY S. D. H.	APPROVED H. H. S. H.	SCALE NONE	SHEET OF

4

3

2

1

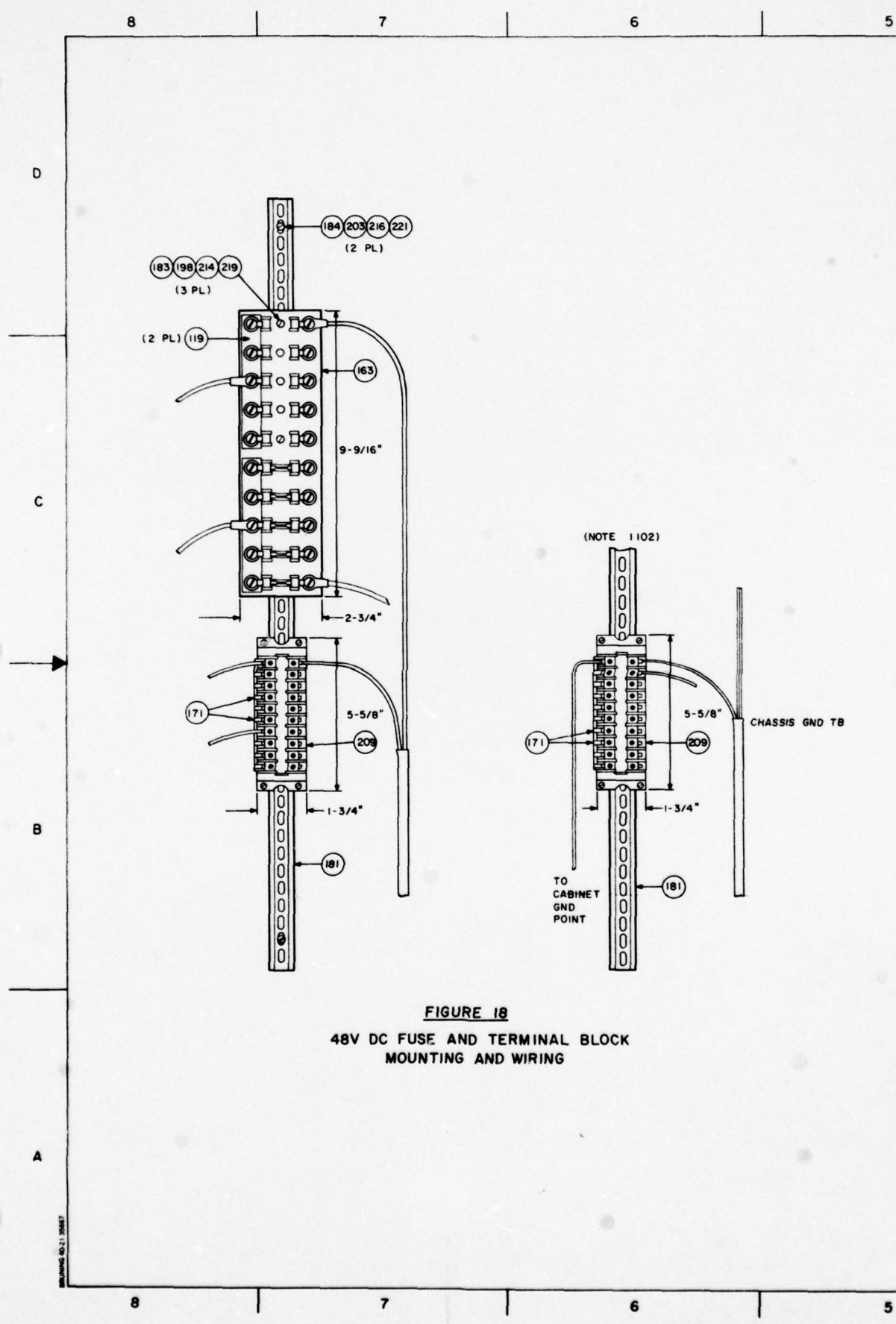


FIGURE 18
48V DC FUSE AND TERMINAL BLOCK
MOUNTING AND WIRING

FUSE NO.	RATING A	WIRE SIZE, AWG
1	1 NORMAL	18
2	2 NORMAL	18
3	3 NORMAL	18
4	5 NORMAL	16
5	8 NORMAL	14
6	10 NORMAL	14
7	15 NORMAL	12
8	5 SLO-BLO	16
9	10 SLO-BLO	14
10	15 SLO-BLO	12

(NOTE 1101)

FUSE NO.	RATING A	WIRE SIZE, AWG (NOTE 1103)
1	1	#18
2	2	#18 TO 14
3	3	#18 TO 14
4	4	#16 TO 12
5	5	#16 TO 12
6		
7		

4

3

2

1

REVISION				
ZONE	REV	DESCRIPTION		DATE
				APPROVED

TABLE 7

CABINET FUSE ASSIGNMENTS

CAB#

WIRE SIZE, AWG	EQUIP	MAX LOAD, A (TYPICAL)	FUSE TYPE	MFGR'S NO.
18		0.5	5 AG	LITTLEFUSE 512001
18		1.1	5 AG	LITTLEFUSE 512002
18		2.0	5 AG	LITTLEFUSE 512003
16		2.8	5 AG	LITTLEFUSE 512005
14		6	5 AG	LITTLEFUSE 514008
14		7	5 AB	LITTLEFUSE 514010
12		9	5 AB	LITTLEFUSE 514015
16		3.2	5 AB	LITTLEFUSE 523005
14		7.5	5 AB	LITTLEFUSE 523010
12		10.5	5 AB	LITTLEFUSE 523015
SEE 1103	TOTAL			

NOTES:

1101. MOUNT THE FUSE AND TERMINAL BLOCK ASSEMBLIES ON THE LEFT SIDE OF CABINET (FACING REAR).
1102. IF THE EQUIPMENT REQUIRES A CHASSIS GROUND CONNECTION, A GROUNDING BLOCK CAN BE ADDED ON THE CHANNEL BELOW THE 48-V RTN (+) BLOCK. A 3-CONDUCTOR POWER CORD IS REQUIRED, CONNECTED AS SHOWN.
1103. SELECT THE WIRE SIZE BASED ON A MAXIMUM DROP FOR THE LOOP OF 0.35V DC.

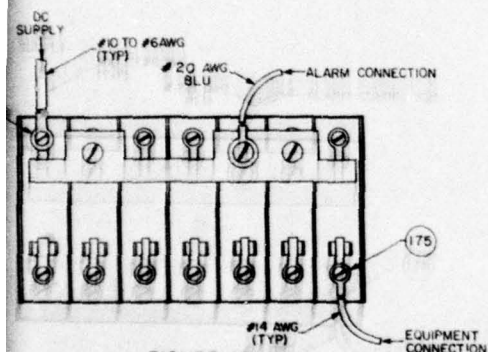


FIGURE 19

BUSS FUSE TERMINAL BLOCK

TABLE 8

BUSS FUSE BLOCK FUSE ASSIGNMENTS

SIZE (103)	EQUIP	MAX LOAD A (TYPICAL)	FUSE TYPE	NSN	MFGR
		0.5		5920-00-665-0515 5920-00-195-2330	BUSS LITTLEFUSE
0 14		1.1		5920-00-295-7013 5920-01-007-5676	BUSS LITTLEFUSE
0 14		1.9		5920-00-503-4843 5920-00-133-4898	BUSS LITTLEFUSE
0 12		2.6		5920-00-806-3152	BUSS
0 12		3.5		5920-01-007-5677	LITTLEFUSE

STD-MS-0021		SIZE FSCW NO.	DRAWING NO.
SHEET 11 OF 26		D 50470	
DRAWN BY S D H		SCALE NONE	SHEET OF
APPROVED <i>H. S. S. S.</i>			

D

C

B

A

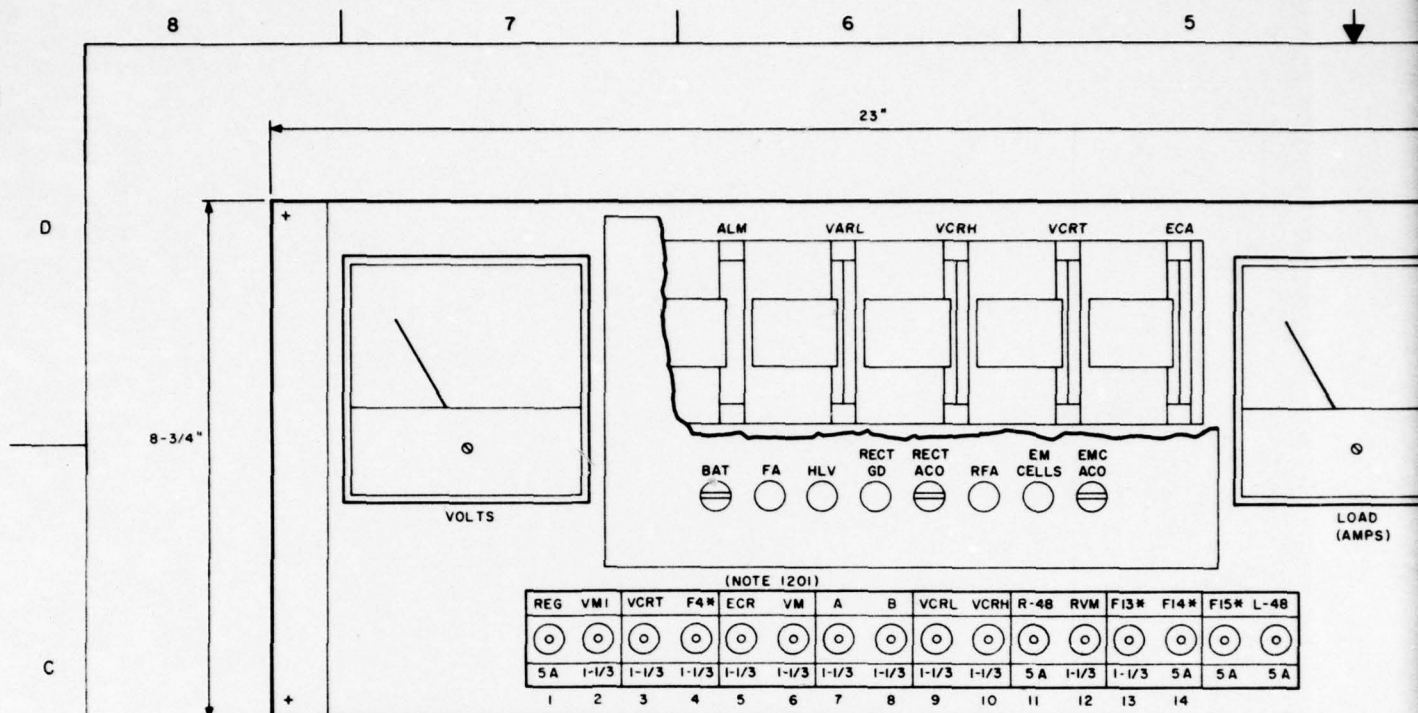
4

2

3

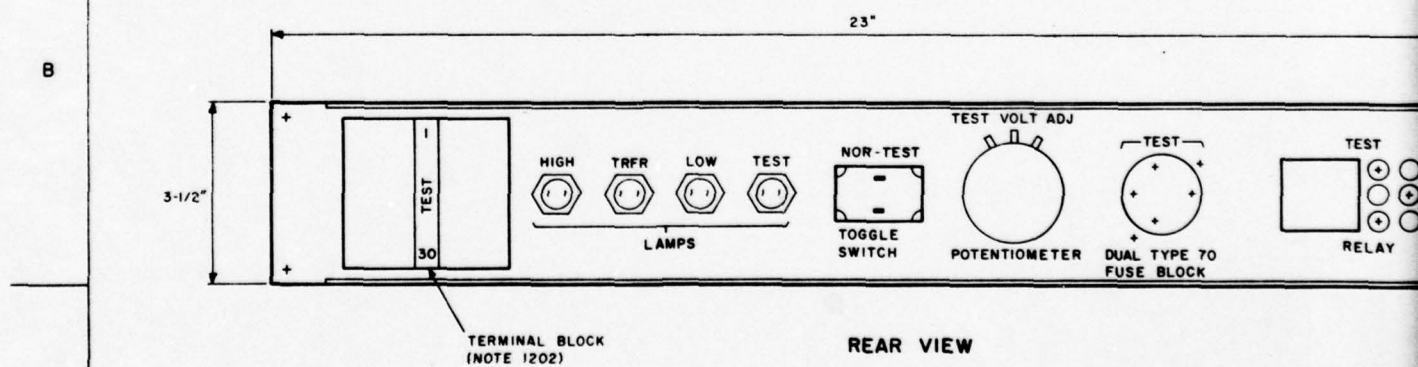
2

1



FRONT VIEW

FIGURE 20
METER & CONTROL PANEL LAYOUT



REAR VIEW

FIGURE 21
TEST PANEL LAYOUT

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

D

C

B

A

DRAWING NO. STD-MS-0021		SHEET NO. 12 OF 28		SHEET NO. D 50470		DRAWING NO.	
DRAWN BY S.D.H.		SCALE NONE		DATE		SHEET OF	
APPROVED <i>H.M. Saha</i>							

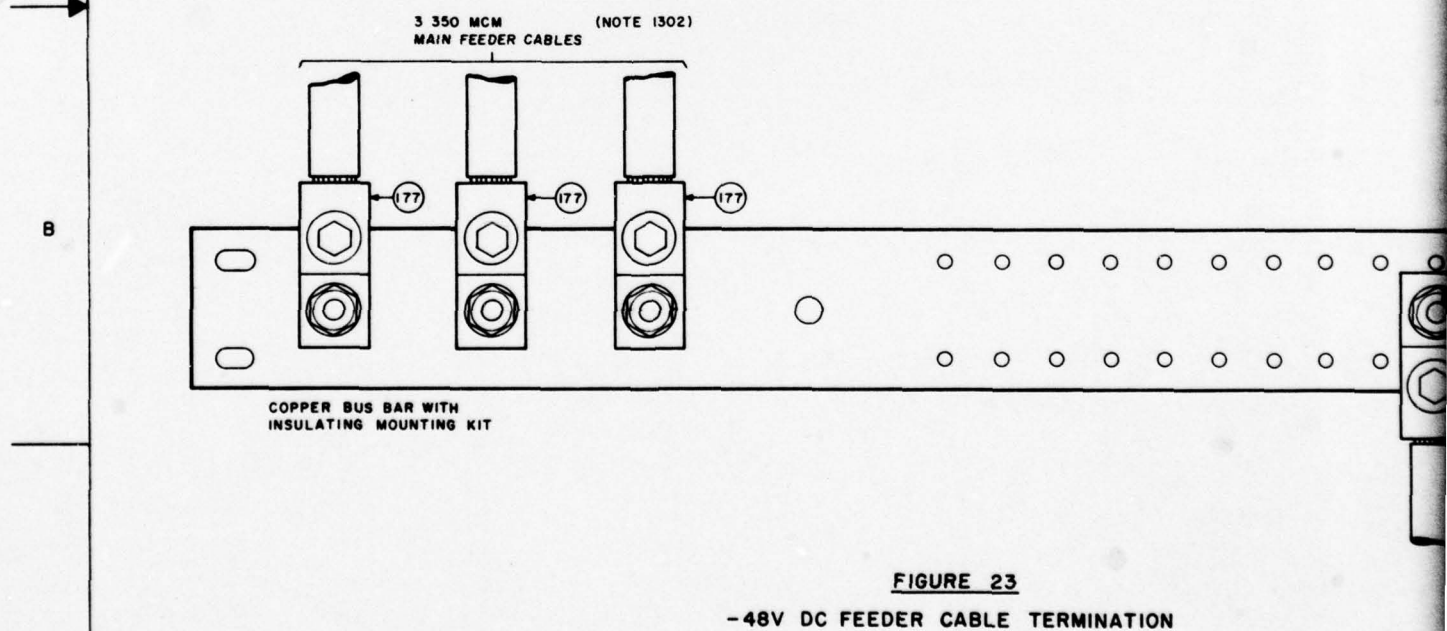
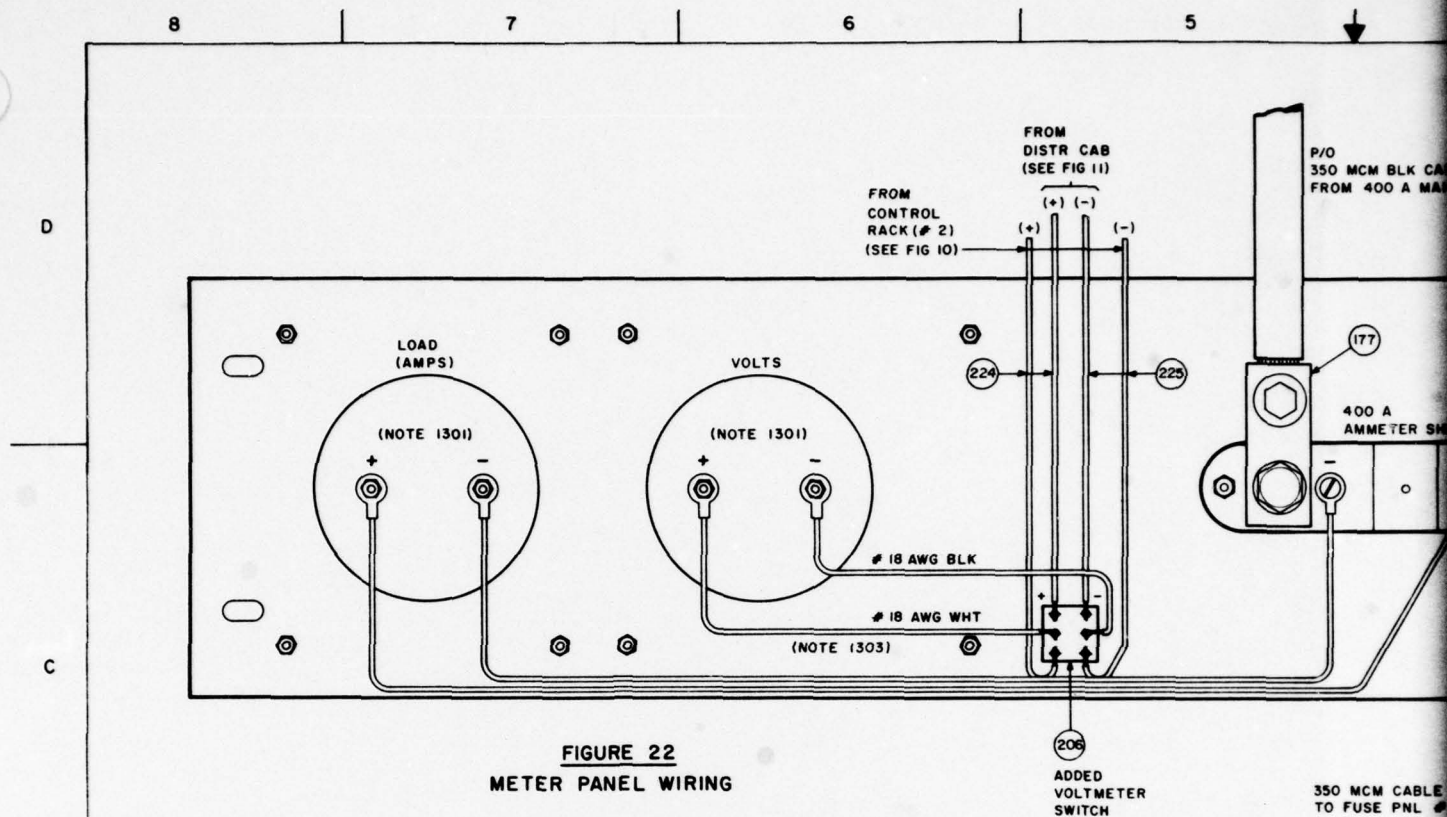
4

2

3

2

1



4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

1301. THE METER TERMINALS MAY BE REVERSED FROM THE WAY SHOWN. CONNECT TO THE CORRECT TERMINALS AS MARKED ON THE METER CASE.
1302. FORM THE 350 MCM CABLES AND SECURE THEM TO THE CABINET TO RELIEVE STRESS ON THE SHUNT TO PREVENT DAMAGE.
1303. USE BLACK-INSULATED WIRE FOR ALL (-) WIRING AND WHITE WIRE FOR ALL (+) METER AND SWITCH WIRING.
1304. AFTER INSTALLING ALL EQUIPMENT AND FUSE PANELS IN FRONT OF THE CABINET, MOUNT THE COPPER BUS BAR HORIZONTALLY ON THE RIGHT SIDE INSIDE THE CABINET (LOOKING FROM THE REAR) IN AN UNOBSTRUCTED LOCATION. SEE FIGURE 11 FOR THE APPROXIMATE LOCATION. USE THE INSULATORS ON EACH SIDE FROM THE LORAIN INSULATING MOUNTING KIT. ENSURE THAT NO BOLT OR ANY METAL PART OF THE BUS BAR ASSEMBLY CONTACTS THE METAL CABINET. THE BUS BAR CAN BE SHORTENED IF NECESSARY TO PROVIDE ADEQUATE CLEARANCE ON ALL SIDES. SEE FIGURE 25 FOR MOUNTING DETAILS.

D

C

B

A

350 MCM CABLE
TO INTERCONNECT BAR
FOR 48V FUSE PNLS #1-4
(NOTE 1302)

DRILL BOLT HOLE
TO FIT BOLT

166

170 (NOTE 1304)

178

P/O
350 MCM BLK CABLE TO
400 A MAIN FUSE PNL

STD-MS-0021

SHEET 13 OF 28

DESIGN BY S.D.H.

APPROVED *Hm Selva*

SIZE/PCOM NO

D 50470

SCALE NONE

DRAWING NO.

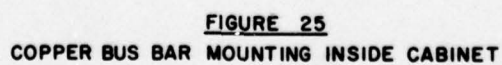
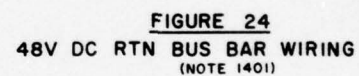
SHEET OF

4

3

2

1



350 MCM CABLE S

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

P/O
350 MCM CABLE
(NOTE 1402)

(177)

NOTES:

1401. AFTER INSTALLING ALL EQUIPMENT AND FUSE PANELS IN FRONT OF THE CABINET, MOUNT THE 48-V DC RETURN BUS BAR HORIZONTALLY ON THE LEFT SIDE INSIDE THE DC POWER DISTRIBUTION AND CONVERTER CABINET (LOOKING FROM THE REAR) IN AN UNOBSTRUCTED LOCATION. SEE FIGURE 11 FOR THE APPROXIMATE LOCATION. USE THE LORAIN INSULATING MOUNTING KIT. SEE FIGURE 25 FOR MOUNTING DETAILS.
1402. FORM THE 350 MCM CABLES TO RELIEVE STRESS ON THE BUS BAR. SECURE THE CABLES TO THE SIDE OF THE CABINET USING TY-RAPS OR LACING TWINE. IF IT IS NECESSARY TO REDUCE TO A SMALLER (MORE FLEXIBLE) CABLE SIZE, THE 350 MCM CABLES CAN BE REDUCED TO #4/0 AWG USING THE TUBULAR 2-WAY CONNECTORS SHOWN IN FIGURE 26.
1403. AFTER INSTALLATION, CHECK EACH BAR WITH AN OHMMETER TO THE CABINET BARE METAL TO ENSURE THAT IT IS INSULATED.
1404. PART OF INSULATING MOUNTING KIT.
1405. NO. 50 ALLEN WRENCH.
1406. COVER THE SPLICE WITH HEAT-SHRINK TUBING.

DRILL 4 NEW HOLES

P/O 350
MCM CABLE

(NOTE 1405)

(117)

1-25/32"

P/O 350 MCM
OR SMALLER CABLE

2-3/4"

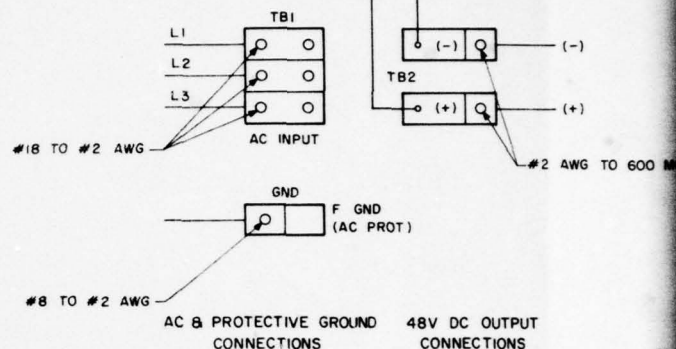
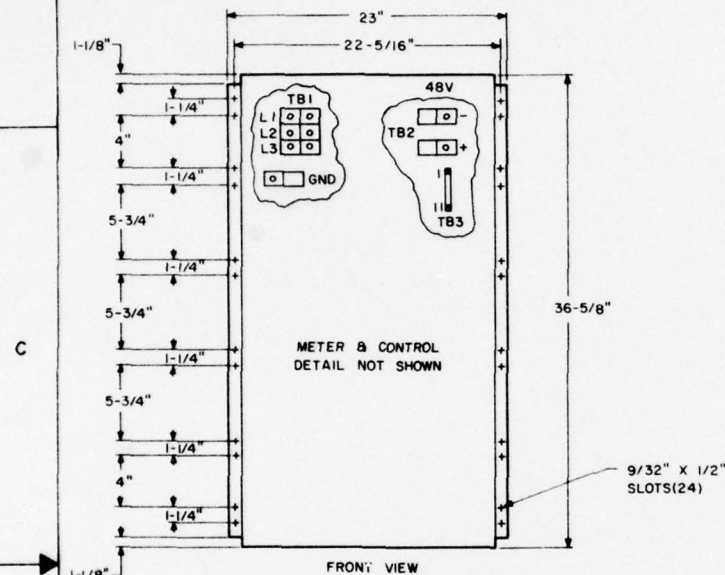
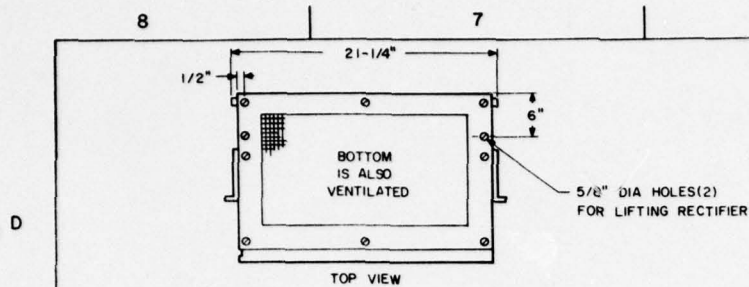
(NOTE 1406)

300 TO 500 MCM
CABLE SIZE EACH
END

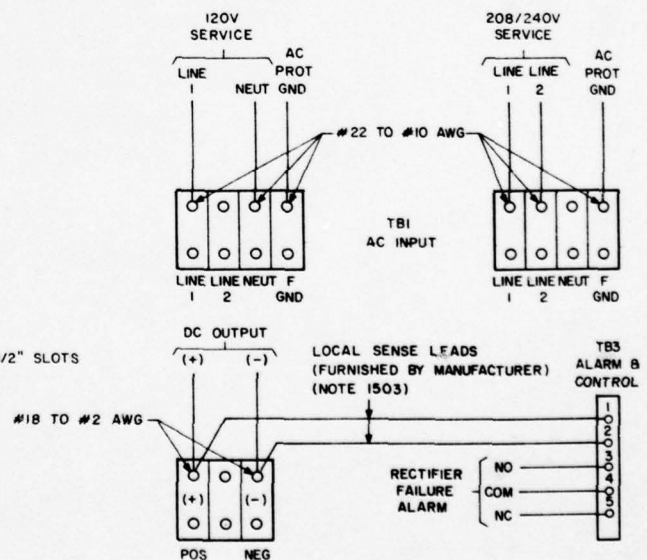
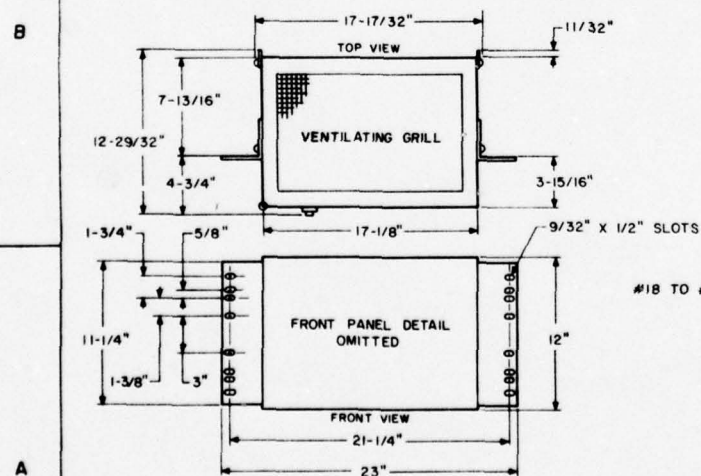
FIGURE 26

CABLE SPLICE OR WIRE SIZE REDUCER

STANDARD STD-MS-0021		SIZE TECH NO.	DRAWING NO.
SHEET 14 OF 28		D 50470	
DRAWN BY S. D. H.		SCALE NONE	CHECKED BY
APPROVED <i>Am Sch</i>			



DETAIL F
RHM200C50 OR RHM 200D50 DIMENSIONS
& LOCATION OF TERMINAL BOARDS



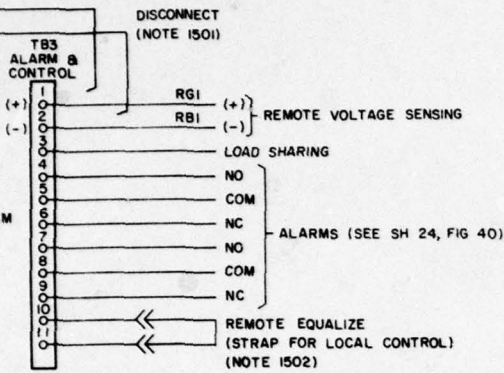
4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE



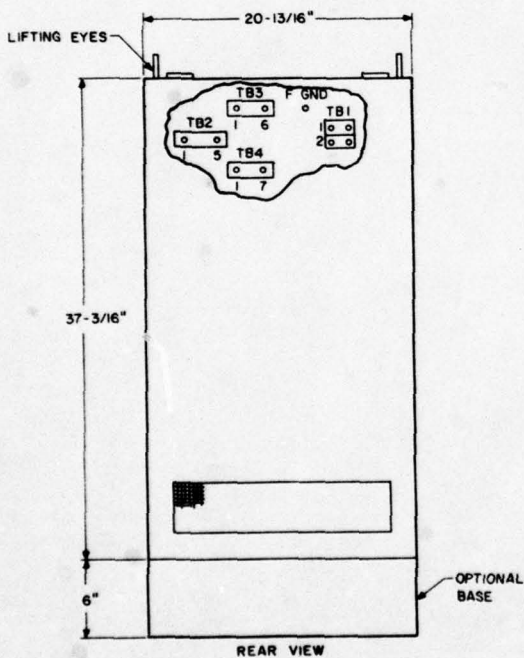
ALARM & CONTROL CONNECTIONS

NOTES:

1501. DISCONNECT AND TAPE THE LOCAL SENSE LEADS. CONNECT THE REMOTE BATTERY VOLTAGE SENSING WIRES.
1502. CHECK TO ENSURE THAT THIS CONNECTION IS IN PLACE FOR LOCAL EQUALIZE SWITCHING. REFER TO THE RECTIFIER-CHARGER INSTRUCTION MANUAL.
1503. LOCAL SENSE WIRING IS SHOWN. FOR REMOTE SENSING CONSULT THE MANUFACTURER'S MANUAL.

G

ER AC & DC POWER,
L CONNECTIONS



DETAIL J

2 KVA, 50 OR 60HZ
FLOOR MOUNTING INVERTER

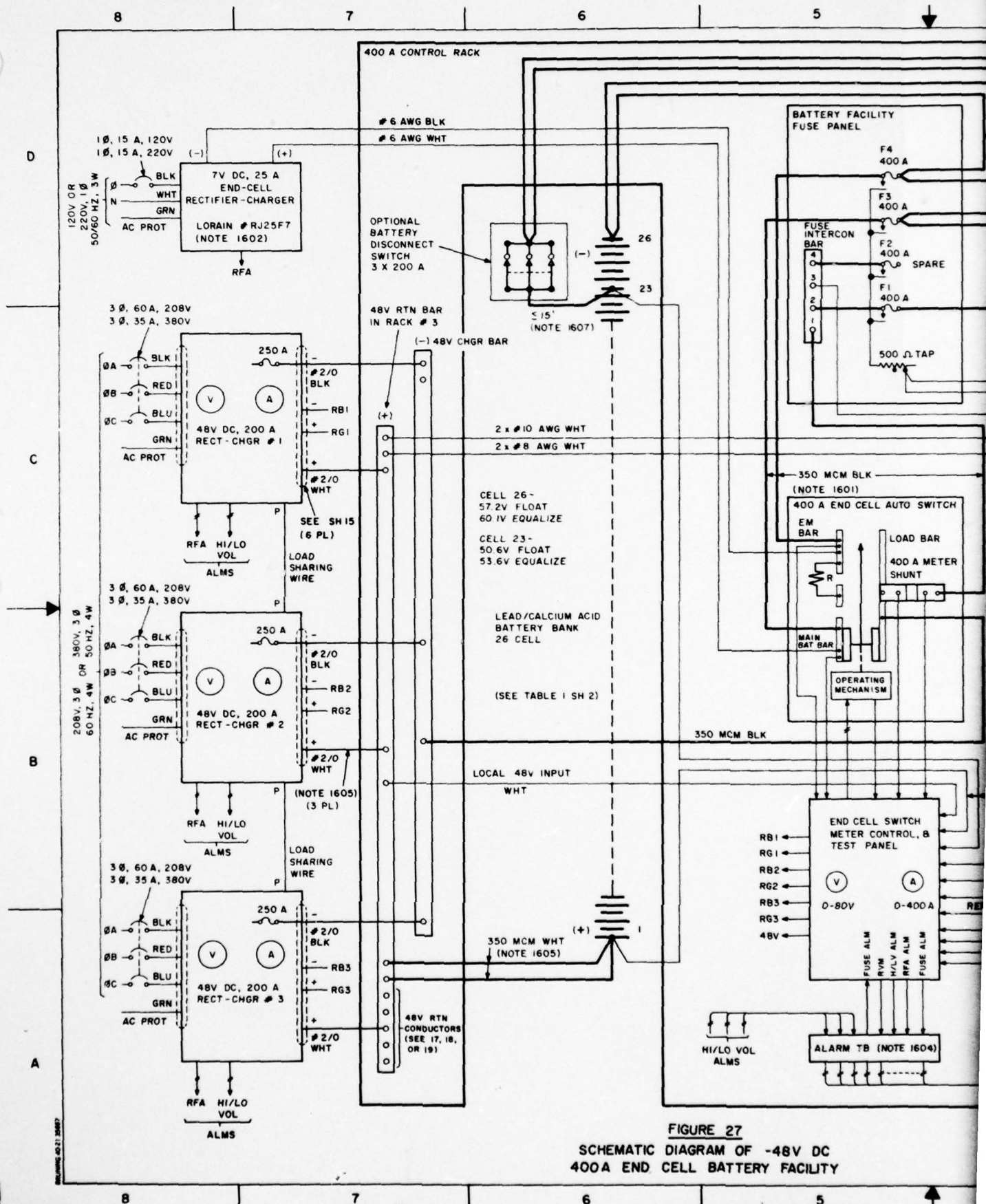
REVISED BY STD-MS-0021 SHEET 13 OF 26	SIZE D 50470	DRAWING NO.
DRAWN BY G. VERDI	SCALE NONE	SHEET OF
APPROVED H. J. S. S. S.		

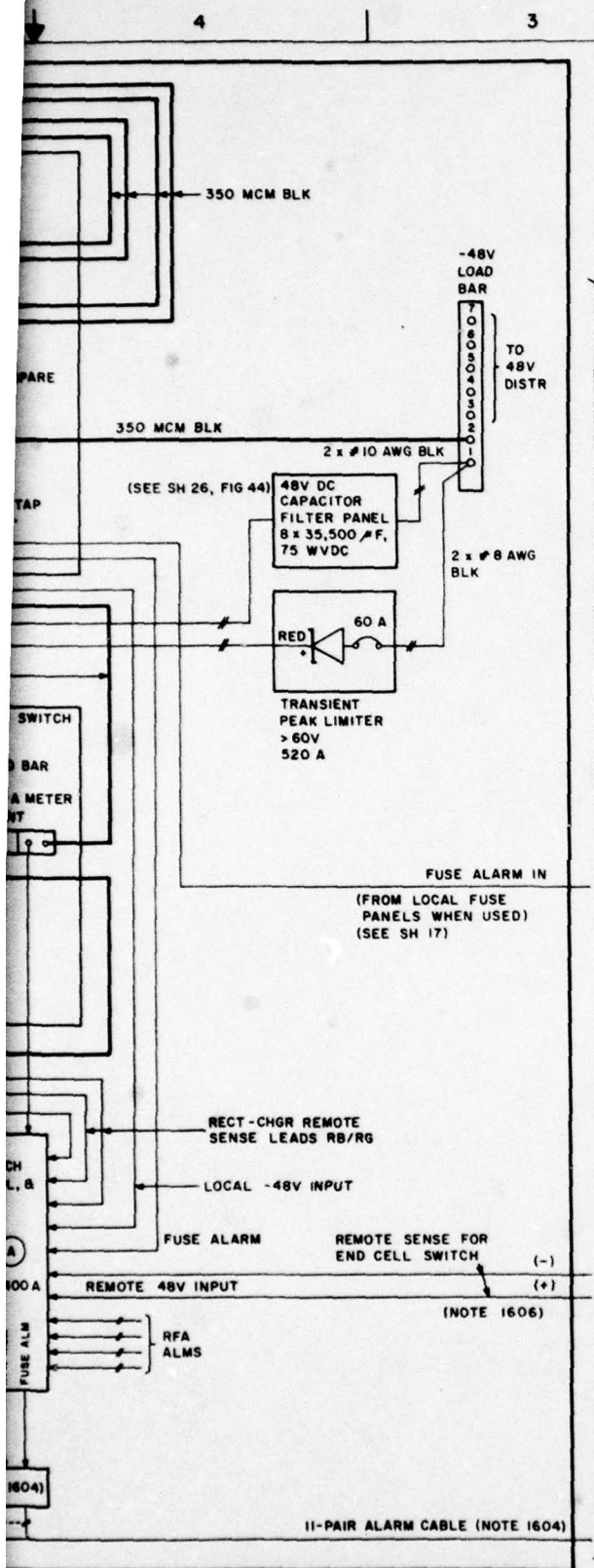
4

3

2

1





REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

A AMPERES
V VOLTS
Ø AC PHASE
N AC NEUTRAL
P AC PROTECTIVE
R LOW OHMIC VALUE RESISTOR
* NUMBER OF CONDUCTORS

NOTES:

1601. THE END-CELL SWITCH OPERATES WHEN THE VOLTAGE ACROSS THE DISTRIBUTION CABINET LOAD BARS FALLS BELOW 46 VOLTS, ADDING THE 3 END CELLS IN SERIES WITH THE MAIN BATTERY. THIS RAISES THE LOAD VOLTAGE TO 52 V DC.
1602. LOCAL SENSING IS USED FOR THE END-CELL RECTIFIER-CHARGER; SEE SHEET 24.
1603. REMOTE SENSING IS USED FOR THE MAIN RECTIFIER-CHARGERS; SEE SHEET 24.
1604. THE ALARM CABLE TERMINATES AT THE CDF FOR LOCAL DISTRIBUTION AND AT ANOTHER ALARM TB IN THE DISTRIBUTION CABINET FOR REMOTE DISTRIBUTION. SEE SHEET 24 FOR LOCAL AND SHEET 25 FOR REMOTE DISTRIBUTION.
1605. NORMALLY WHITE-INSULATED CABLES ARE USED FOR THE DC RETURN (+) CABLES. WRAP BANDS OF WHITE PLASTIC TAPE AROUND EACH END OF BLACK-INSULATED (+) CABLES FOR IDENTIFICATION.
1606. THE REMOTE SENSE LEADS FOR THE END-CELL SWITCH ARE USED ONLY WITH THE REMOTE DISTRIBUTION.
1607. USE TWO 350MCM CABLES IF THE CABLE DISTANCE BETWEEN BATTERY POST AND SWITCH EXCEEDS 15 FEET.

SEE
SH 17,
18, OR 19

IDENT NO STD-MS-0021		SIZE	PSCH NO D 50470	ENGINE NO
SHEET 18 OF 28				
DRAWN BY S. D. H.				
APPROVED H. J. S. S.		SCALE NONE	SHEET OF	

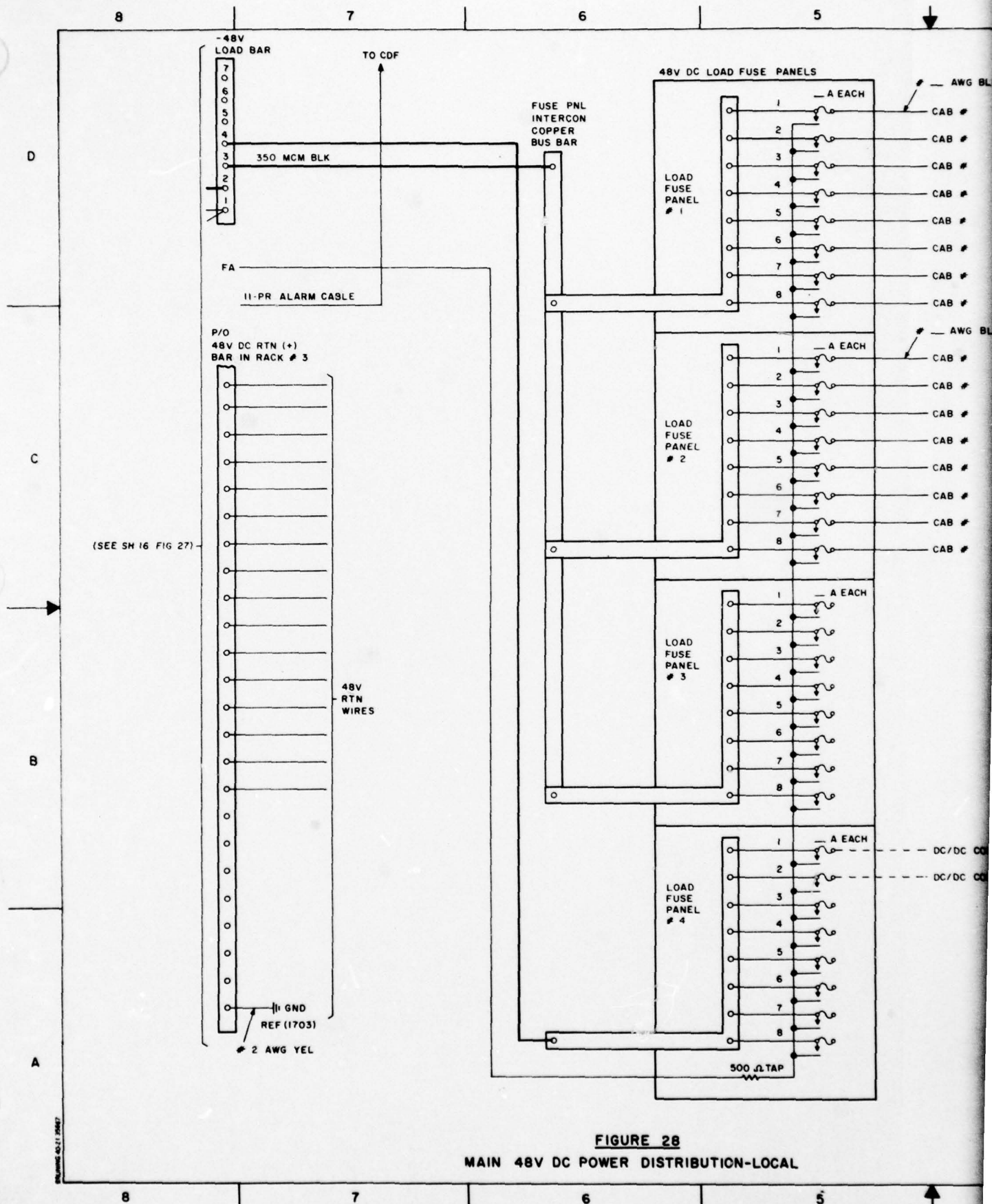


FIGURE 28
MAIN 48V DC POWER DISTRIBUTION-LOCAL

4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

— AWG BLK (NOTE 1702)

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

— AWG BLK (NOTE 1702)

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

NOTES:

1701. SELECT THE APPROPRIATE FUSE RATING FOR THE LOAD AND FUSE PANEL.
1702. SELECT THE WIRE SIZE TO LIMIT VOLTAGE DROP TO 0.3 V AT RATED LOAD.
1703. CONNECT TO STATION GROUND BOX OR EARTH ELECTRODE.

D

C

B

A

KEY ID	STD-MS-0021	SIZE	PSCW NO	SHEDDING NO
SHEDDING	17 OF 28	D	50470	
DRAWN BY	S.D.H.	SCALE	NONE	SHEDDING
APPROVED	H.M. Sola			OF

4

2

3

2

1

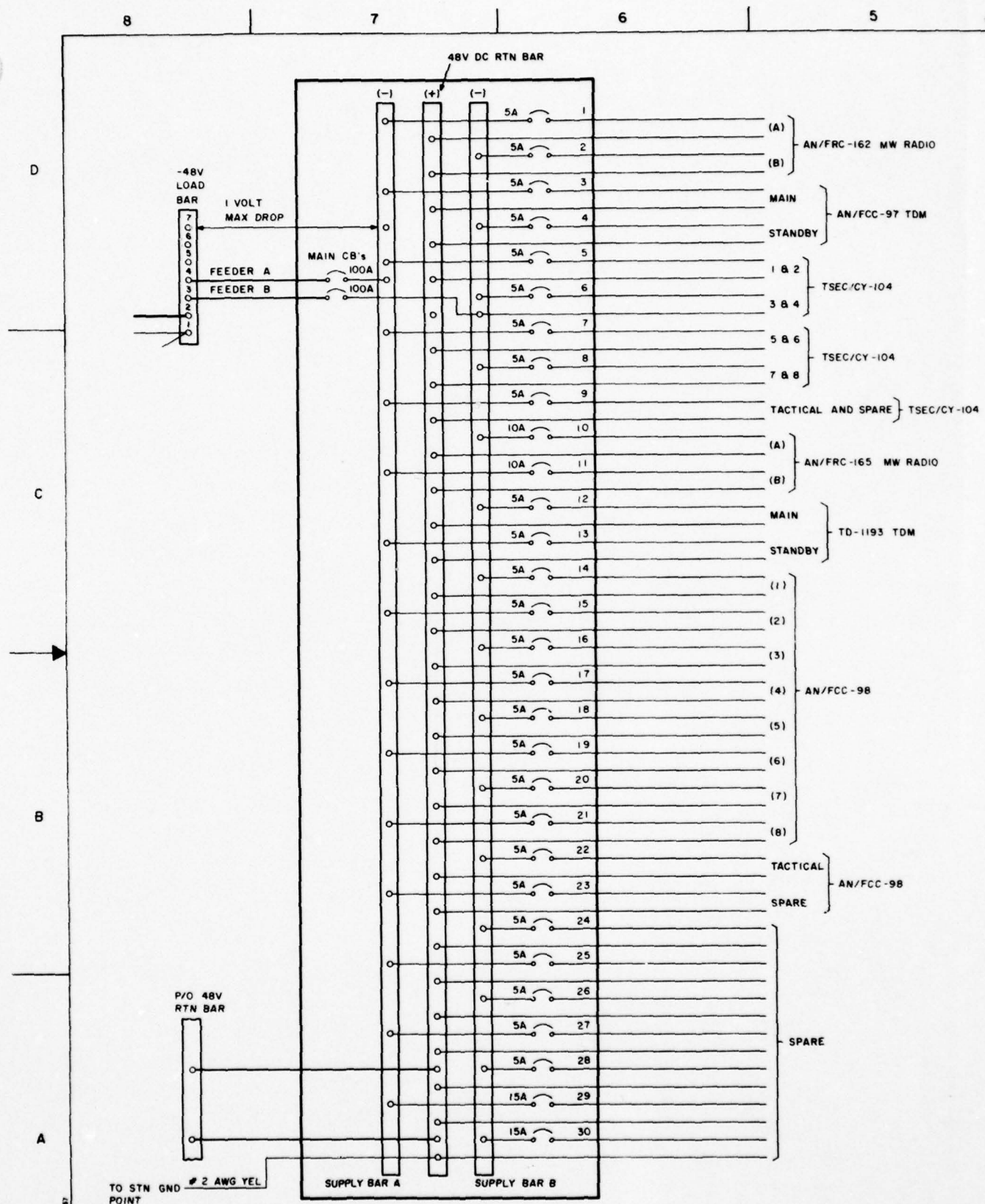


FIGURE 29

48V DC POWER DISTRIBUTION CIRCUIT BREAKER PANEL

(NOTE 1801)

DRAWING 40-21-15487

REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:



CIRCUIT BREAKER WITH RATING.

NOTES:

1801. THIS PANEL IS WALL-MOUNTED NEAR THE COMMUNICATIONS EQUIPMENT SUPPLIED. MORE THAN ONE PANEL CAN BE USED.
1802. ESTIMATE.
1803. FOR LOOP LENGTHS BETWEEN 50 AND 85 FEET.
1804. DETERMINE CIRCUIT BREAKER REQUIREMENTS ON A SITE-BY-SITE BASIS AND ORDER THE PANEL EQUIPPED TO THE EXACT REQUIREMENTS.

TABLE 9
48-V DC DISTR/CIRCUIT BREAKER PANEL DATA

CIRCUIT BREAKER NO.	EQUIPMENT	APPROX LOAD, A DC	RECOMMENDED CB, A DC	RECOMMENDED WIRE SIZE, AWG (NOTE 1803)
1	AN/FRC-162 (A)	3.1	5	14
2	AN/FRC-162 (B)	3.1	5	14
3	AN/FCC-97 MAIN	2.0	5	14
4	AN/FCC-97 STANDBY	2.0	5	14
5	TSEC/CY-104 ALM PNL 1 & 2	0.2-1.0	5	18-16
6	TSEC/CY-104 ALM PNL 3 & 4	0.2-1.0	5	18-16
7	TSEC/CY-104 ALM PNL 5 & 6	0.2-1.0	5	18-16
8	TSEC/CY-104 ALM PNL 7 & 8	0.2-1.0	5	18-16
9	TSEC/CY-104 ALM TACTICAL PNL & SPARE	0.2-1.0	5	18-16
10	AN/FRC-165 (A)	5.0 (NOTE 1802)	10	12
11	AN/FRC-165 (B)	5.0 (NOTE 1802)	10	12
12	TD-1193 MAIN	2.5 (NOTE 1802)	5	14
13	TD-1193 STANDBY	2.5 (NOTE 1802)	5	14
14	TD-1192 (1)	2.8	5	14
15	TD-1192 (2)	2.8	5	14
16	TD-1192 (3)	2.8	5	14
17	TD-1192 (4)	2.8	5	14
18	TD-1192 (5)	2.8	5	14
19	TD-1192 (6)	2.8	5	14
20	TD-1192 (7)	2.8	5	14
21	TD-1192 (8)	2.8	5	14
22	TD-1192 TACTICAL	2.8	5	14
23	TD-1192 SPARE	2.8	5	14
24	SPARE		5	
25	SPARE		5	
26	SPARE		5	
27	SPARE		5	
28	SPARE		5	
29	SPARE		15	
30	SPARE		15	

IDENT NO.
STD-MS-0021
SHEET 18 OF 28

DRAWN BY S. D. H.

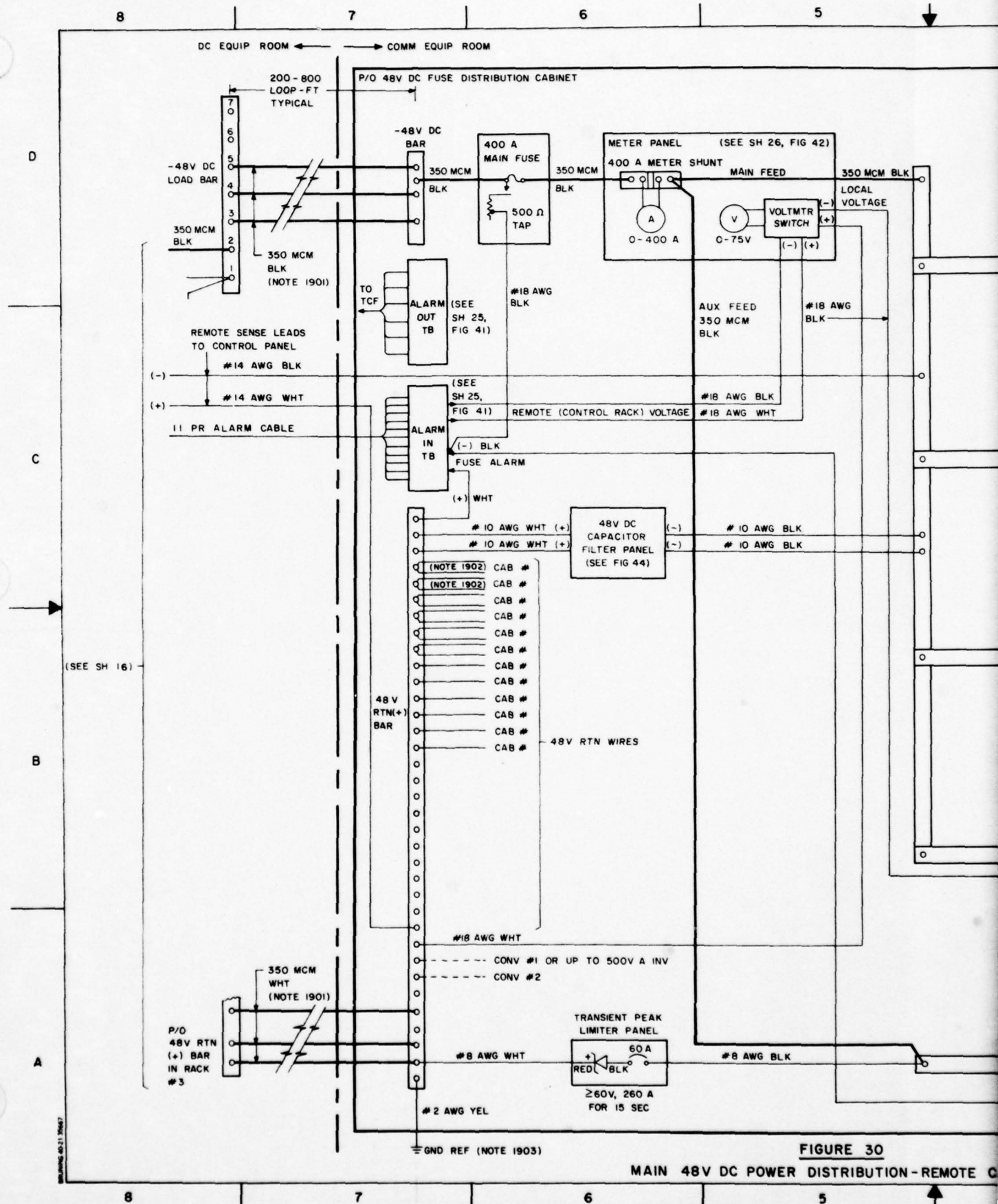
APPROVED *H. M. Soler*

SIZE/TSCW NO.
D 50470

DRAWING NO.

SCALE NONE

SHEET OF



4

3

2

1

REVISION			
ZONE	REV	DESCRIPTION	DATE

48V DC LOAD FUSE PANELS

LOAD
FUSE
PANEL
#1

50 A EA

(NOTE 1902)

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

LOAD
FUSE
PANEL
#2

30 A EA

(NOTE 1902)

CAB #

CAB #

CAB #

CAB #

CAB #

CAB #

LOAD
FUSE
PANEL
#3

30 A EA

LOAD
FUSE
PANEL
#4

30 A

30 A

6 A

6 A

6 A

6 A

LOCAL VOLTMETER

LOAD
FUSE
PANEL
#5
(MISC)

30 A

30 A

30 A

60 A

60 A

60 A

500Ω TAP

--- CONV #1

--- CONV #2

--- INVERTER UP TO 500VA
(NOTE 1904)

NOTES:

1901. SELECT THE NUMBER OF CABLES TO LIMIT DC VOLTAGE DROP TO 1 V FOR THE MAIN DC POWER RUN WITH A FULL LOAD.
1902. SIZE THE FEEDER CABLES FOR A VOLTAGE DROP NOT TO EXCEED 0.3 V DC AT FULL RATED CURRENT.
1903. THE REFERENCE GROUND WIRE IS CONNECTED TO THE STATION GROUND BOX.
1904. INVERTERS LARGER THAN 500 VA SHOULD BE INSTALLED IN THE DC EQUIPMENT ROOM.

D

C

B

A

-REMOTE CABINET

STO-MS-0021
SHEET 19 OF 25

DRAWN BY G. VERDI

APPROVED H. M. Selen

SHEET FROM NO
D 50470

SCALE NONE

DRAWING NO

SHEET OF

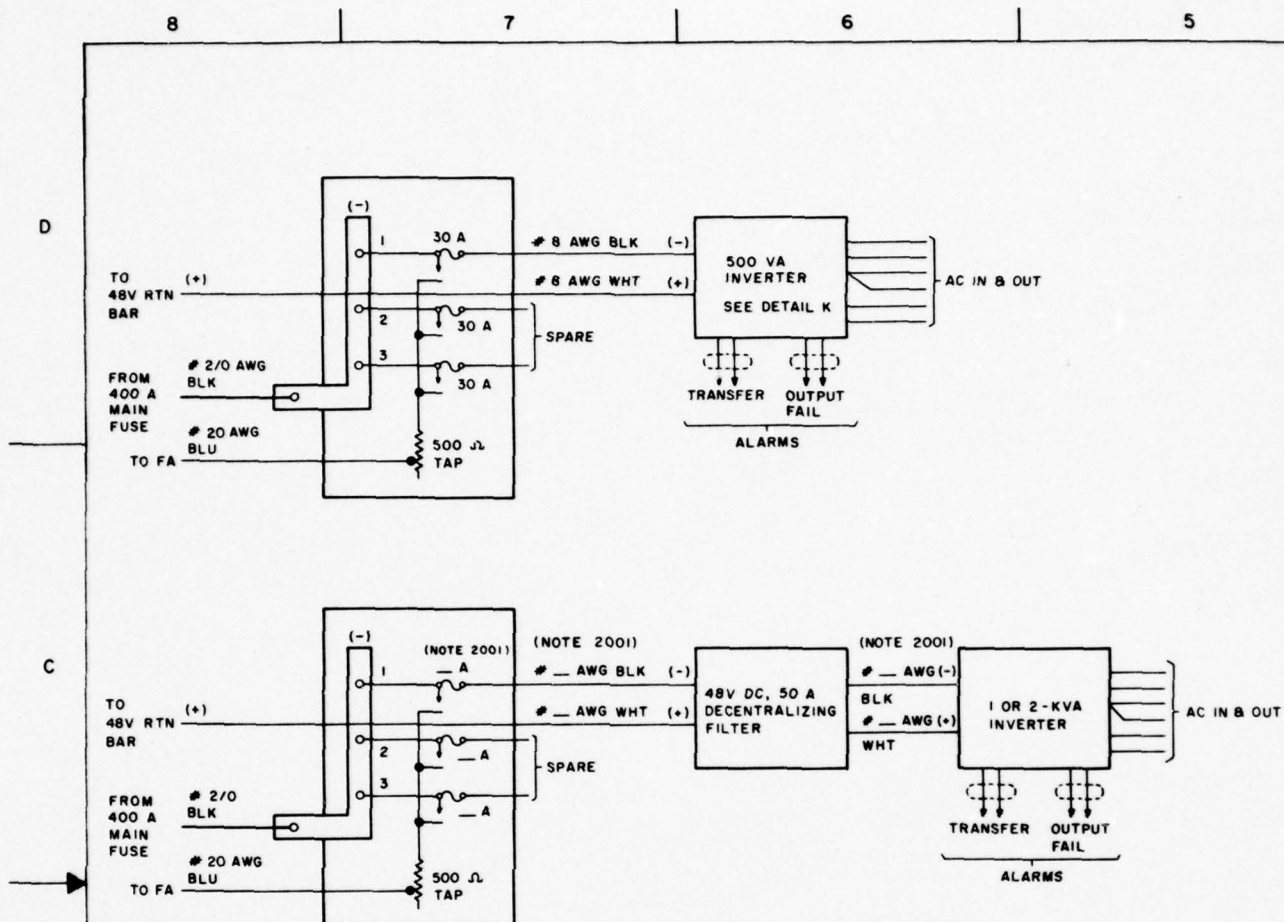


FIGURE 31
500VA, 1-, AND 2-KVA INV
DISTRIBUTION AND FILTERING

(NOTE 2001)

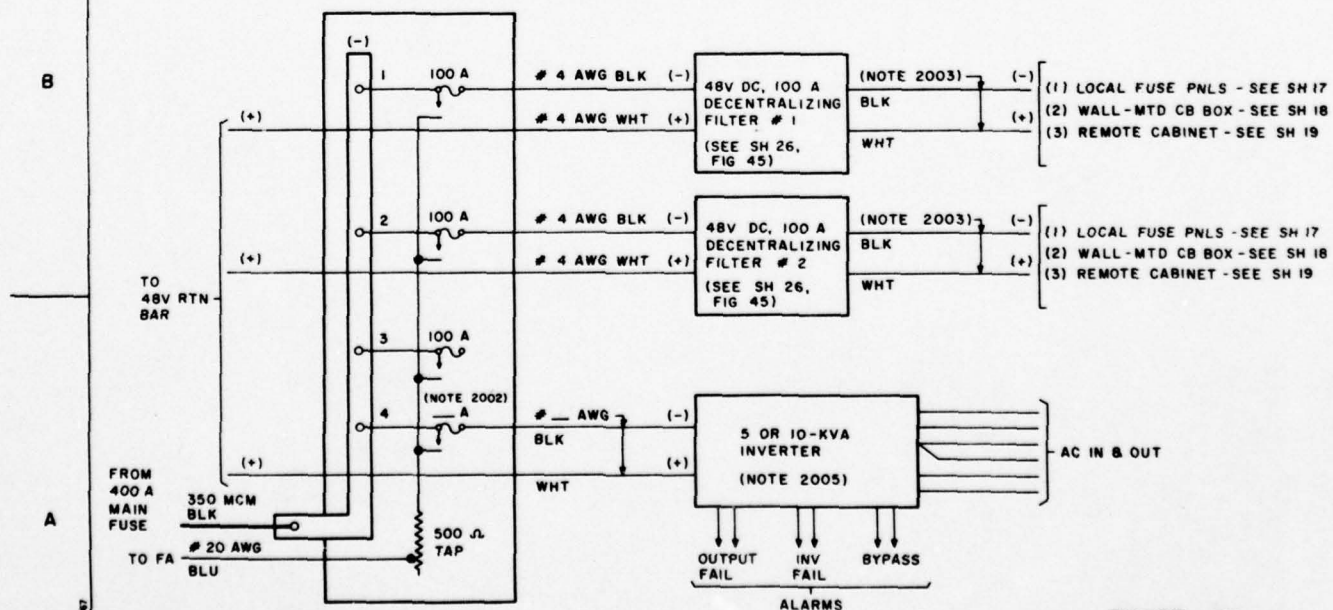


FIGURE 32
5- AND 10-KVA INVERTER
DISTRIBUTION AND FILTERING

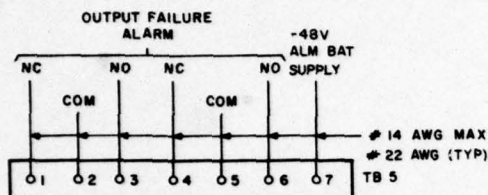
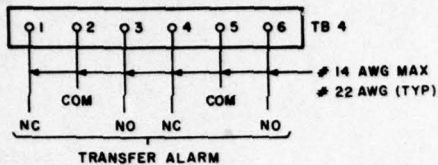
REVISION 65-21-20007

4

3

2

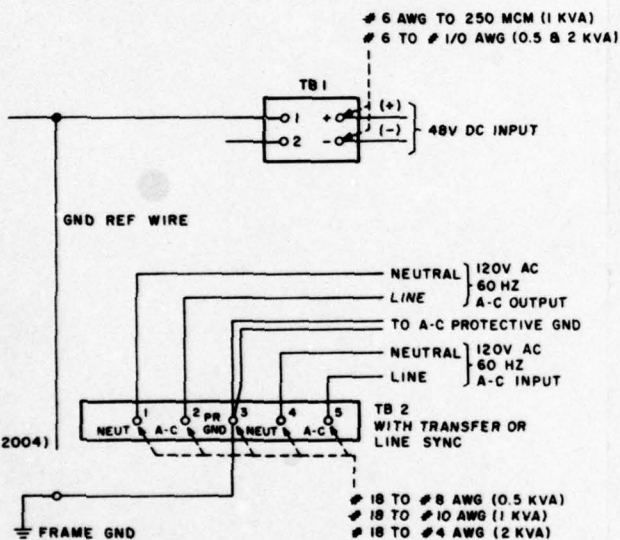
1



REVISION			
ZONE	REV	DESCRIPTION	DATE

NOTES:

2001. SELECT THE FUSE RATING AND WIRE SIZE FROM TABLE 10.
 2002. SELECT THE FUSE RATING AND WIRE SIZE FROM TABLE 11.
 2003. SELECT A WIRE SIZE TO LIMIT VOLTAGE DROP TO 0.5 V DC.
 2004. IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
 2005. SEE SHEET 21 FOR THE 5- AND 10-KVA INVERTER CONNECTIONS.



DETAIL K

0.5, 1, & 2 KVA INVERTER AC & DC
POWER & ALARM CONNECTIONS

TABLE 10

INVERTER	1-KVA	2-KVA
FUSE SIZE, AMPS	50	60
WIRE SIZE, AWG (FOR LOOPS <20')	6	4

TABLE 11

INVERTER	5-KVA	10-KVA
FUSE SIZE, AMPS	200	400
WIRE SIZE, AWG (FOR LOOPS <20')	4/0 AWG	2X4/0 AWG OR 350 MCM

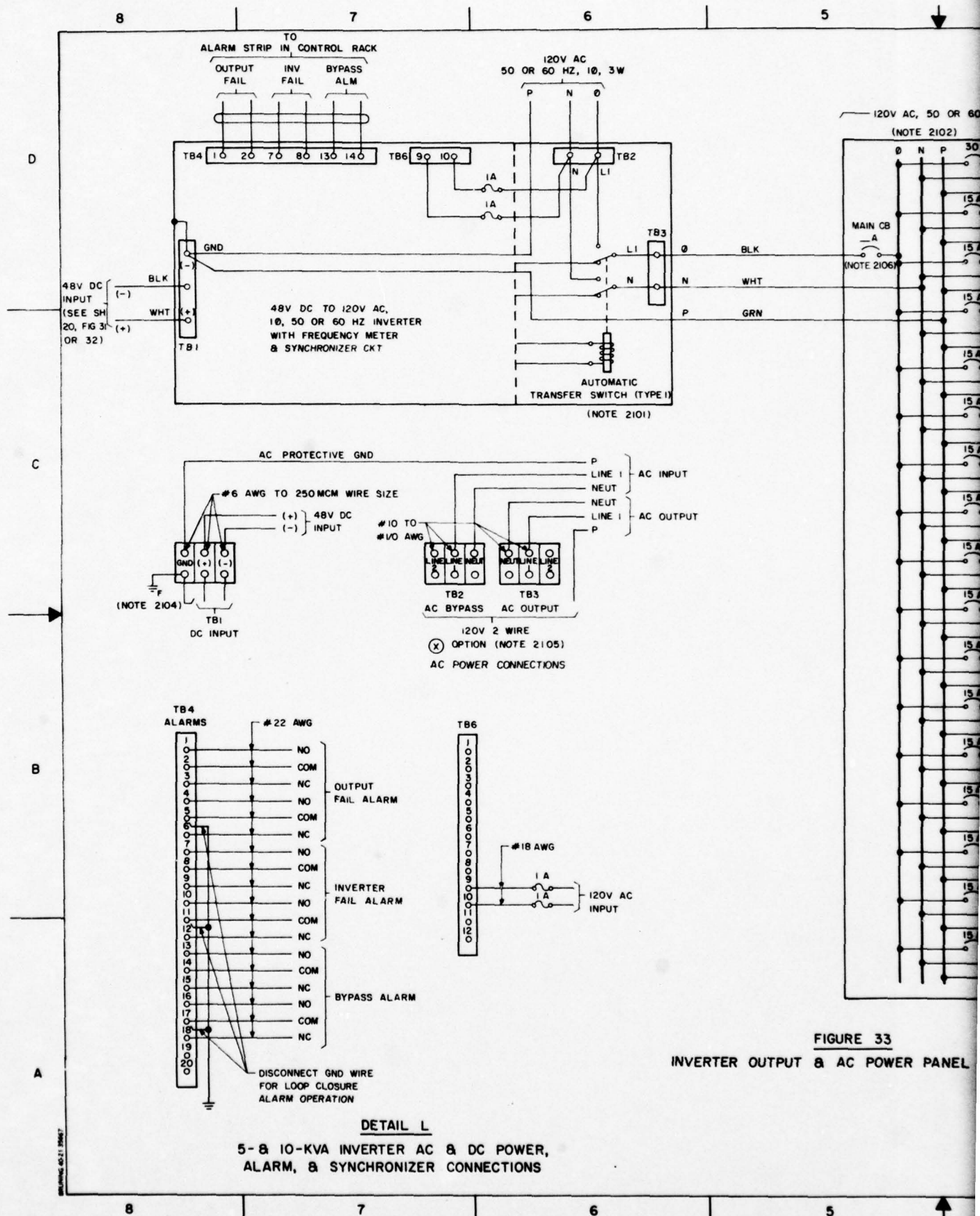
DESK NO. STD-MS-0021 SHEET 20 OF 26		SIZE: PSCN NO. D 50470	DRAWING NO.
DRAWN BY S.D.H.		SCALE NONE	SHEET OF
APPROVED <i>H.M. Saha</i>			

4

3

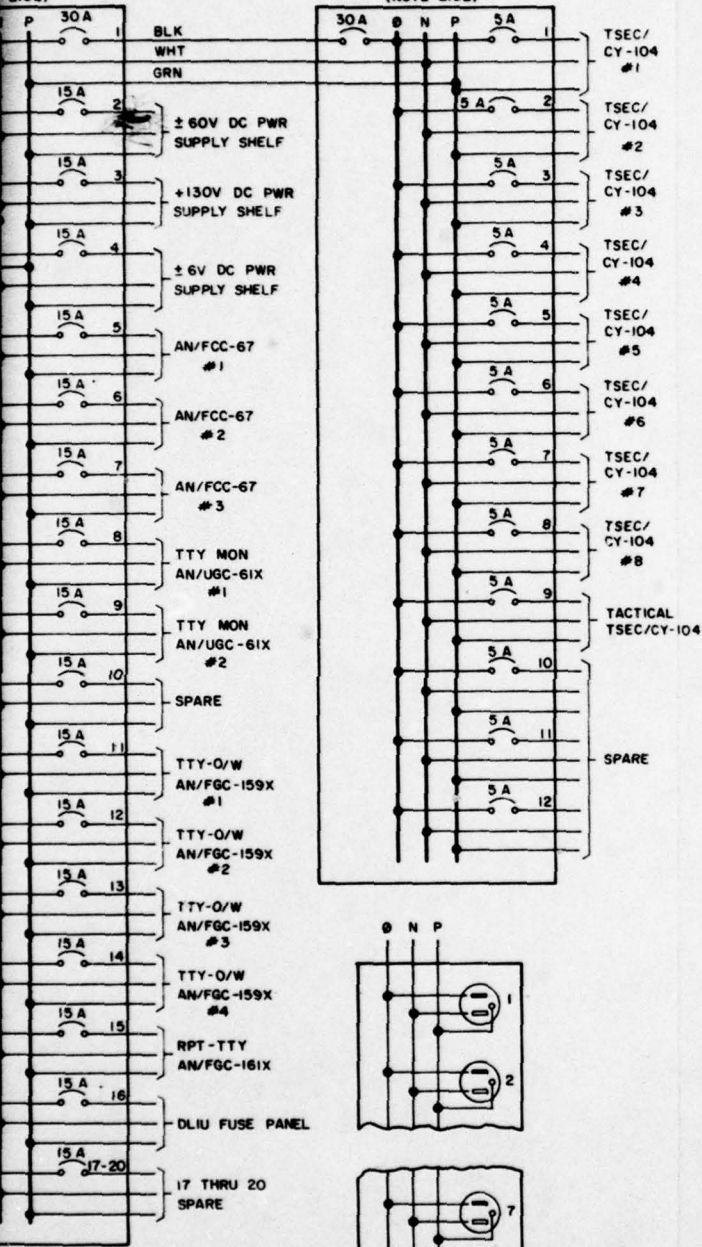
2

1



4		3		2		1	
ZONE		REV		REVISION		DATE	
				DESCRIPTION		APPROVED	

50 OR 60 HZ, 10, 3W INVERTER AC POWER DISTRIBUTION PANELS



- NOTES:
- THE AUTOMATIC TRANSFER SWITCH IS FACTORY INSTALLED AS PART OF THE INVERTER.
 - THE INVERTER POWER PANELS SHOULD BE INCLUDED IN THE EIP.
 - THE INVERTER 120-V AC POWER OUTLET STRIP IS IN ADDITION TO THE REGULAR UTILITY POWER OUTLET STRIP PROVIDED AS PART OF THE CABINET. THE TWO STRIPS CAN BE MOUNTED ON OPPOSITE SIDES. LABEL EACH.
 - IT IS PREFERABLE TO OPERATE THE INVERTER WITH A FLOATING DC INPUT TO PREVENT DC CURRENTS IN GROUND CONDUCTORS. (THERE IS ALREADY A DC GROUND REFERENCE WIRE TO THE (+) SIDE OF THE BATTERY FACILITY.) IF REMOVABLE OF THE GROUND STRAP FROM THE (+) TERMINAL OF THE INVERTER RESULTS IN EXCESSIVE ELECTRICAL NOISE AT THE (+) LOAD BARS, LEAVE THE STRAP CONNECTED.
 - FOR THE 120/240V, 3 WIRE AND 240V, 2 WIRE OPTIONS Y AND Z WIRING, REFER TO THE MANUFACTURER'S INFORMATION SHEETS.
 - SPECIFY THE MAIN CIRCUIT BREAKER SIZE BASED ON THE MAXIMUM INVERTER OUTPUT.

FIGURE 34
INVERTER 120V AC POWER
OUTLET STRIP IN CABINET

IDENT NO.	STD-MS-0021	SIZE	PSCH NO.	BRIDGE NO.
SHEET	21 OF 28	D	50470	
DESIGN BY	G. VERDI	SCALE	NONE	SHEET OF
APPROVED	H.M. Sch			

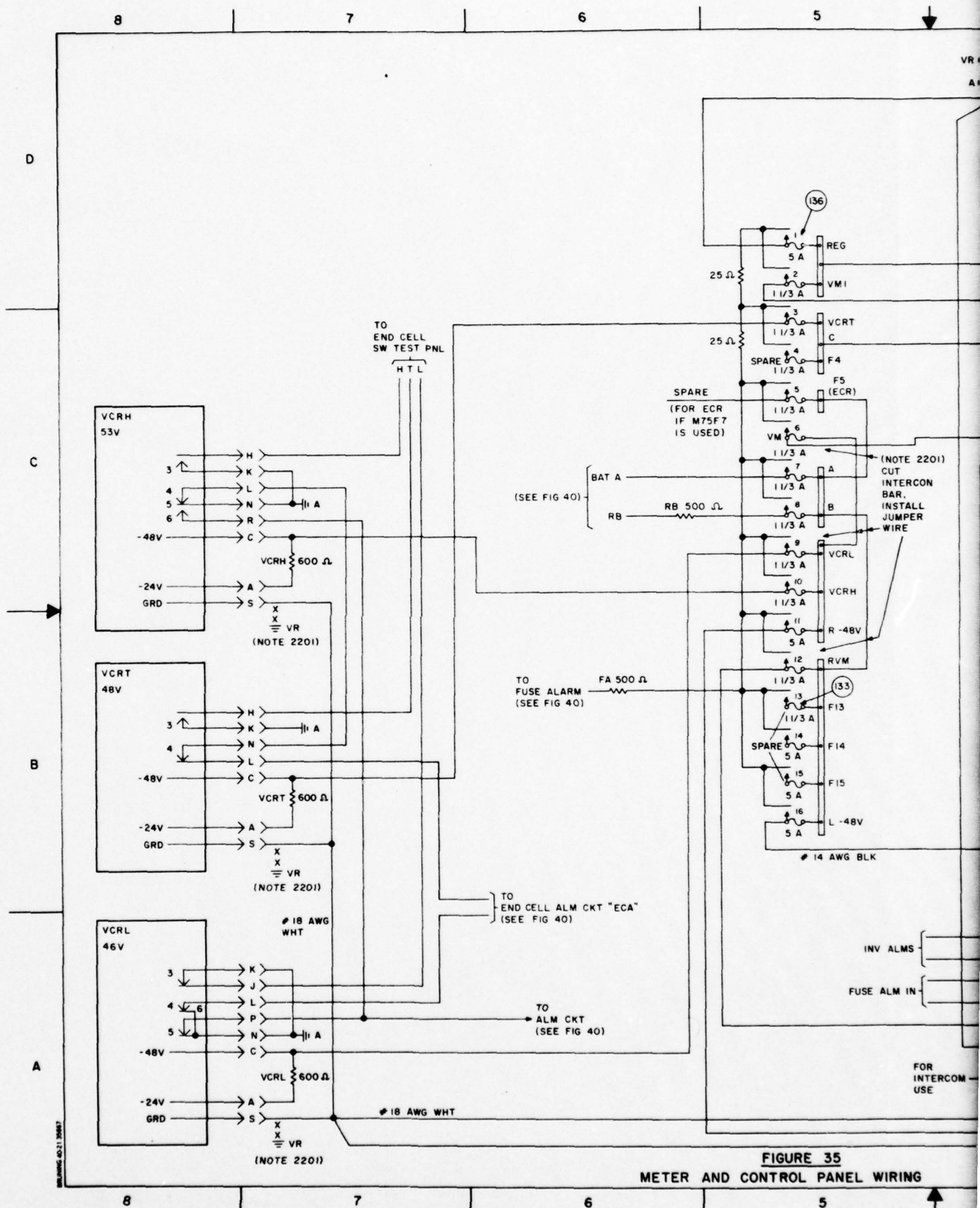
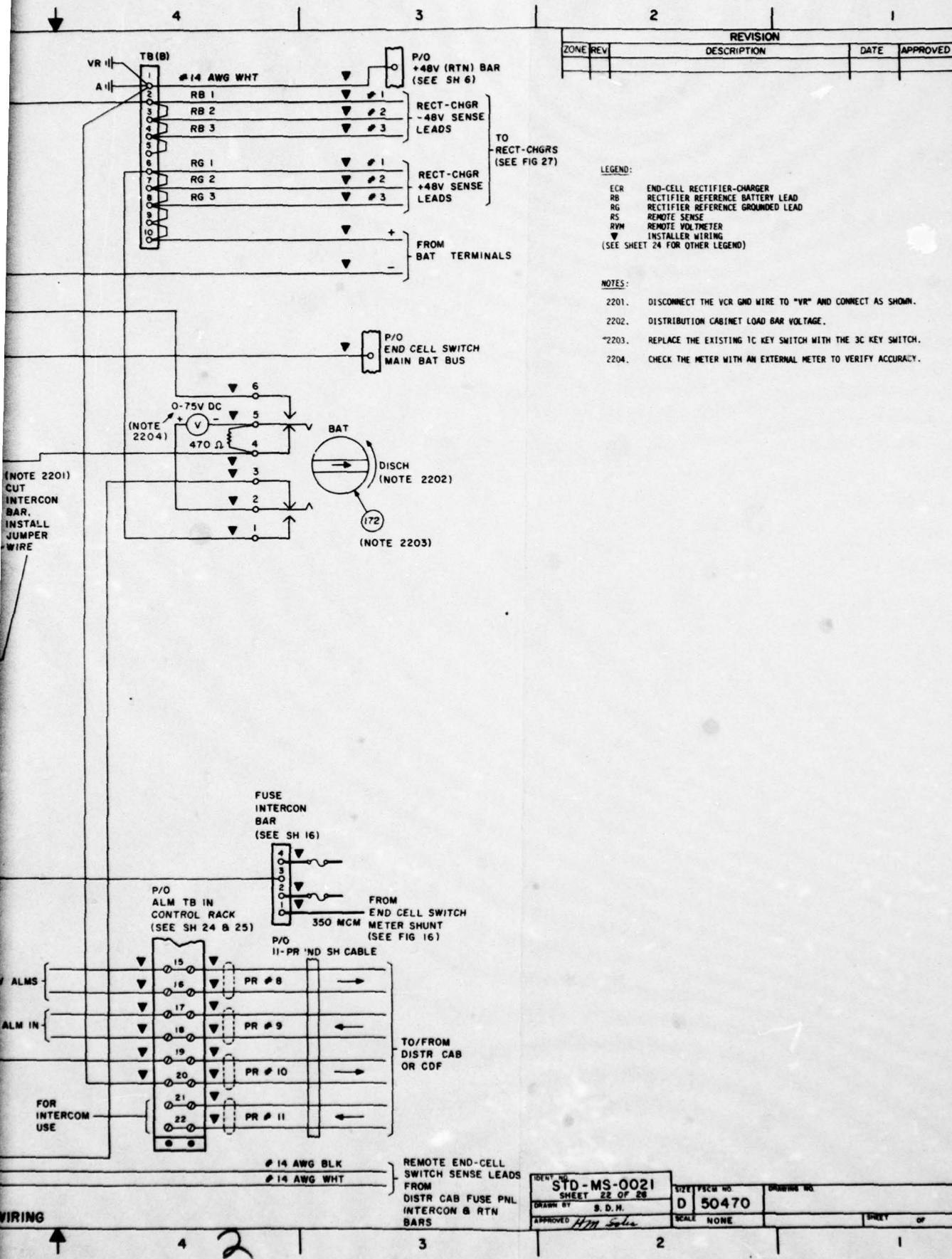


FIGURE 35
METER AND CONTROL PANEL WIRING



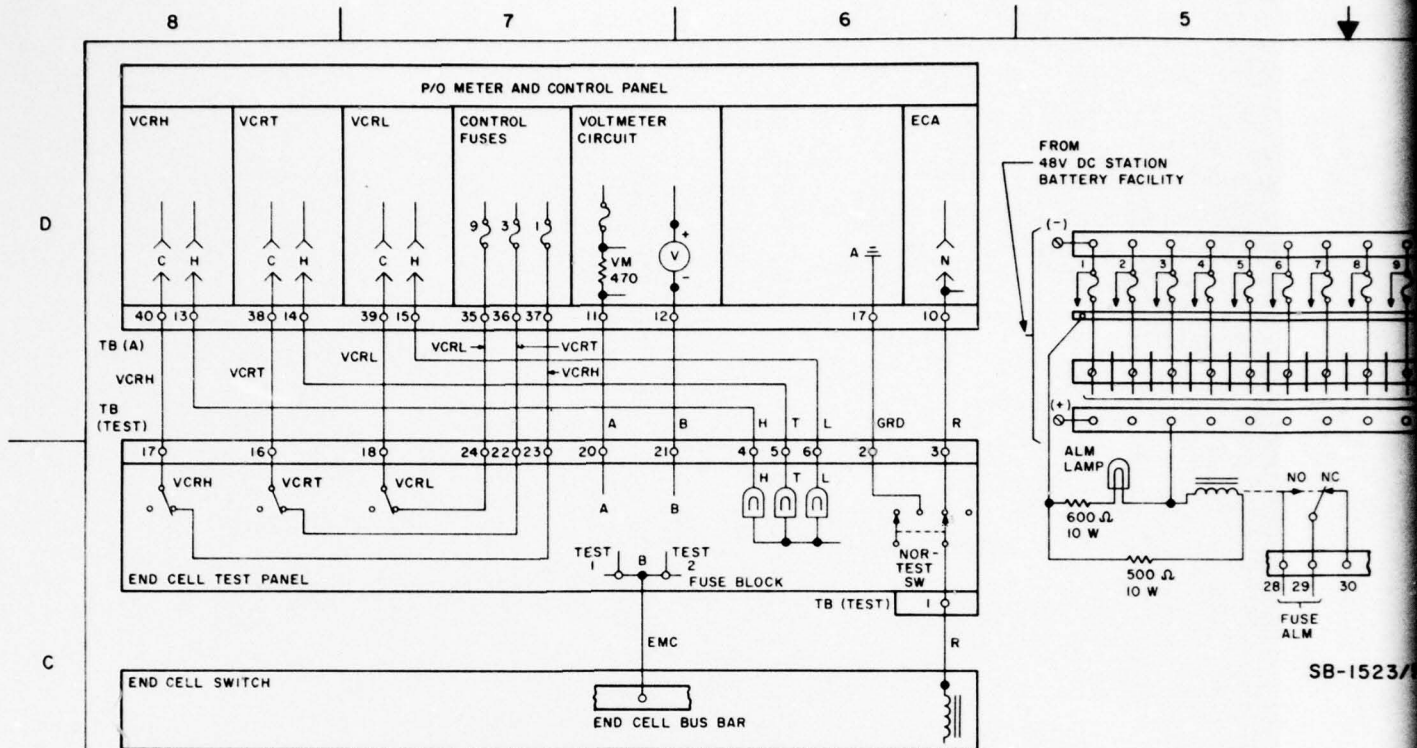
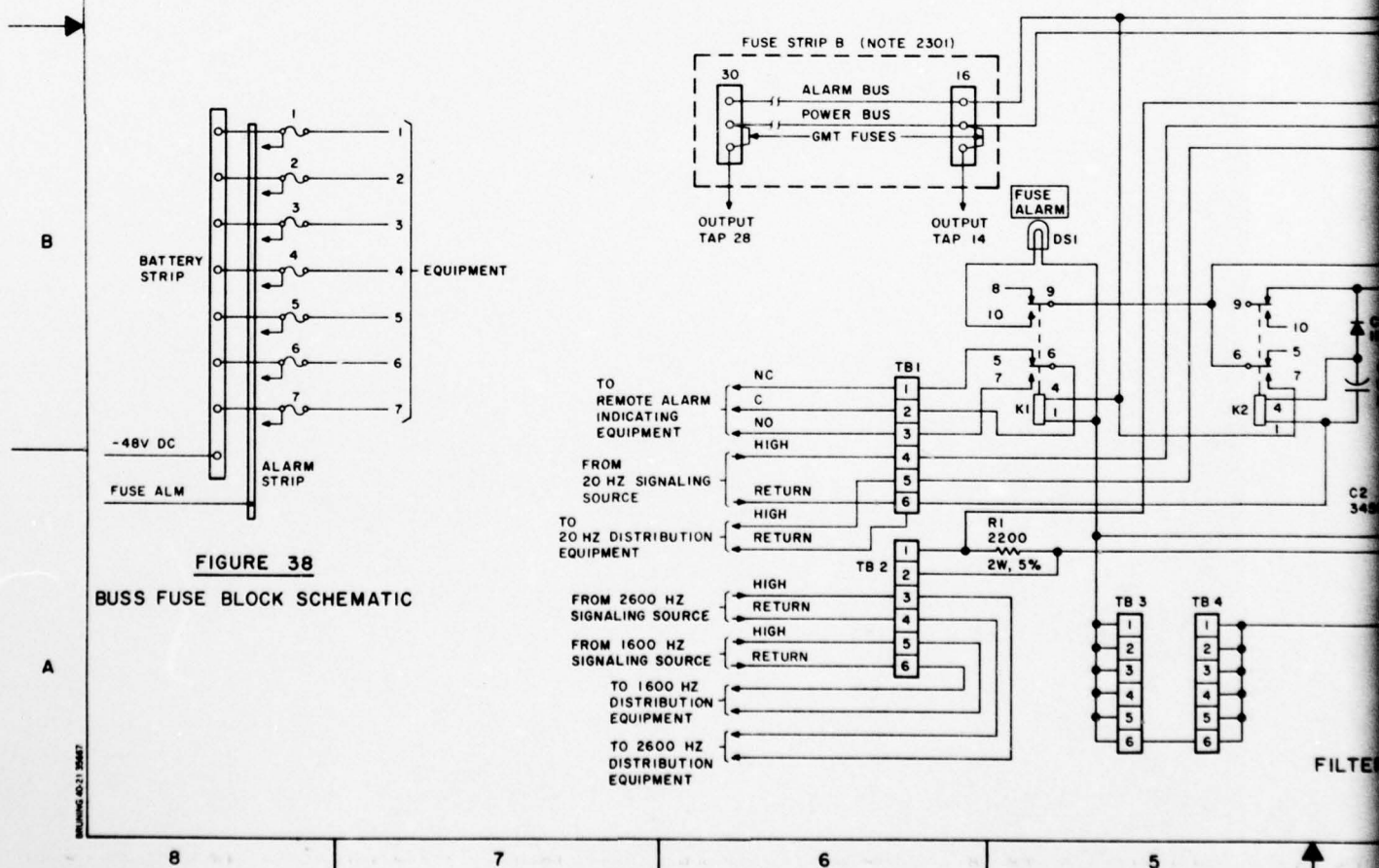


FIGURE 36
TEST PANEL WIRING DIAGRAM



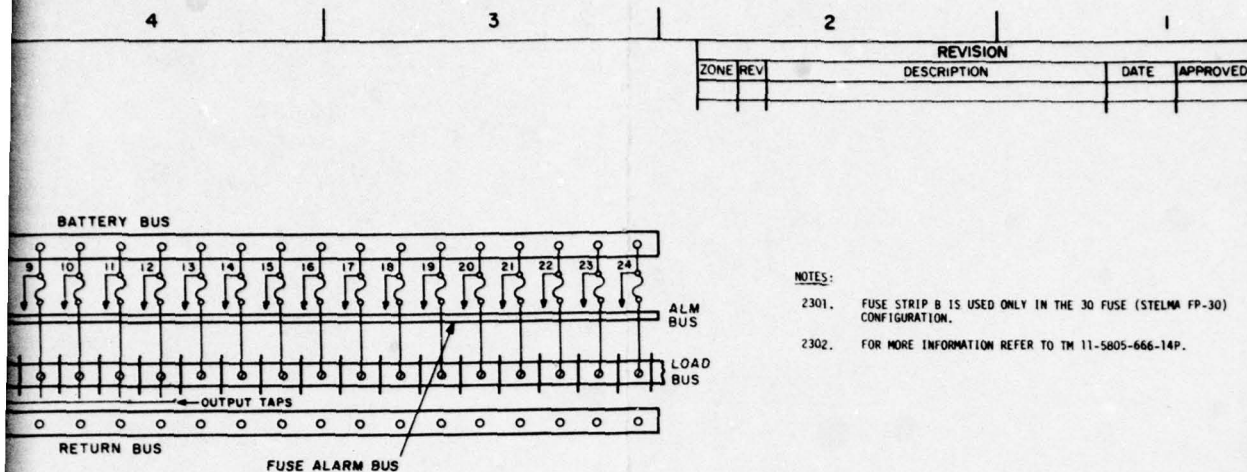


FIGURE 37

23/FT FUSE PANEL SCHEMATIC

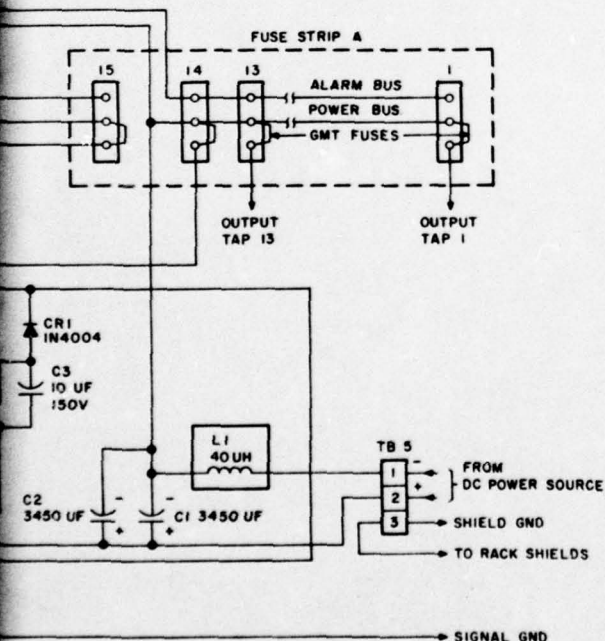


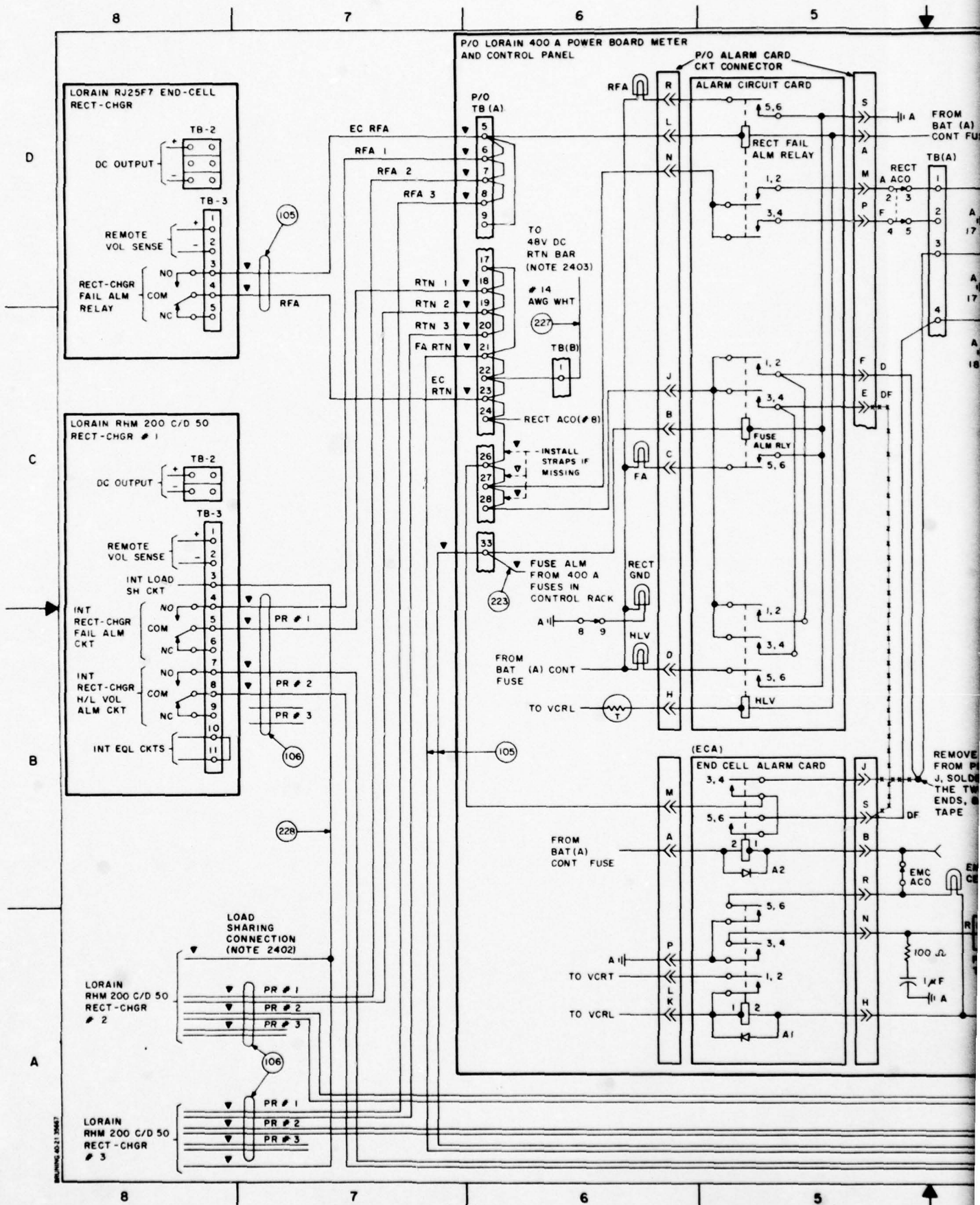
FIGURE 39

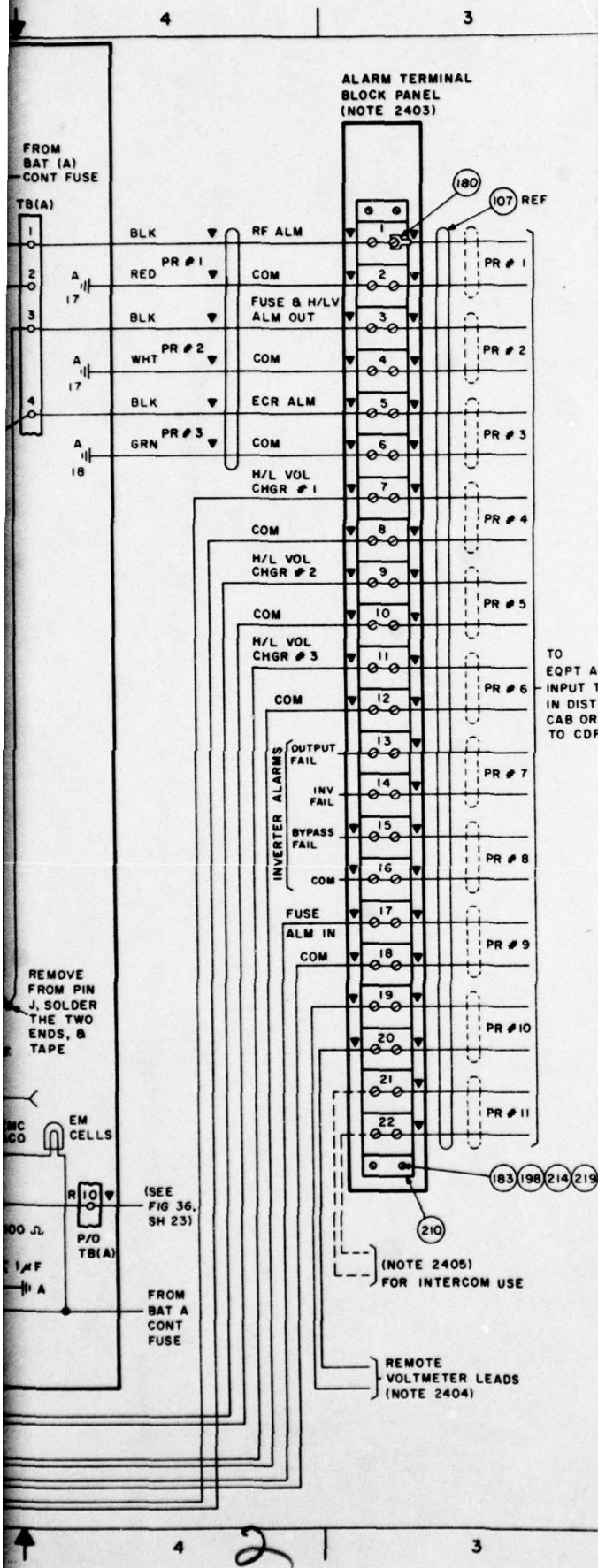
FILTERED GMT FUSE PANEL SCHEMATIC

SB-3800/FTC

(NOTE 2302)

STD-MS-0021		SHEET 23 OF 28	D 50470	BRIDGE NO.
DRAWN BY	S. D. H.	SCALE	NONE	SHEET OF
APPROVED <i>HTM Saha</i>				





REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

- NO NORMALLY OPEN CONTACT
- NC NORMALLY CLOSED CONTACT
- COM MOVABLE CONTACT COMMON TO ABOVE OR RETURN LEAD
- H/L V HIGH/LOW VOLTAGE
- FA FUSE ALARM
- RFA RECTIFIER FAIL ALARM
- RECT ACO RECTIFIER ALARM CUTOFF KEY
- RECT GD CUTOFF LIGHT
- VAR VOLTAGE ALARM RELAY
- VCR VOLTAGE CONTROL RELAY
- XXX WIRING TO BE REMOVED
- ▼ INSTALLER WIRING
- A POWER BOARD TB (A) 48-V RETURN CONNECTION
- VR VOLTAGE RELAY CARD GROUND RETURN
- GRD GROUND RETURN

NOTES:

2401. CHECK TO ENSURE THAT THE LOCAL SENSING LEADS ARE IN PLACE.
2402. INTERCONNECT THE LOAD SHARING WIRE BETWEEN ALL THREE RECTIFIER-CHARGES.
2403. SEE FIGURE 10 OF THIS DRAWING FOR MOUNTING INFORMATION.
2404. CONNECT TO THE +48-V LOAD BARS IN THE CONTROL RACK. SEE FIGURE 30.
2405. USE SOUND-POWERED PHONES OR OTHER INTERCOM TERMINALS (NOT PROVIDED).

FIGURE 40
48V DC ALARM CIRCUIT WIRING -
RECT-CHGRS

IDENT NO. STD-MS-0021		SIZE D	PSCW NO. 50470	DRAWING NO.
SHEET 24 OF 28				
DRAWN BY S. D. H.		SCALE NONE		SHEET _____ OF _____
APPROVED <i>H.M. Sales</i>				

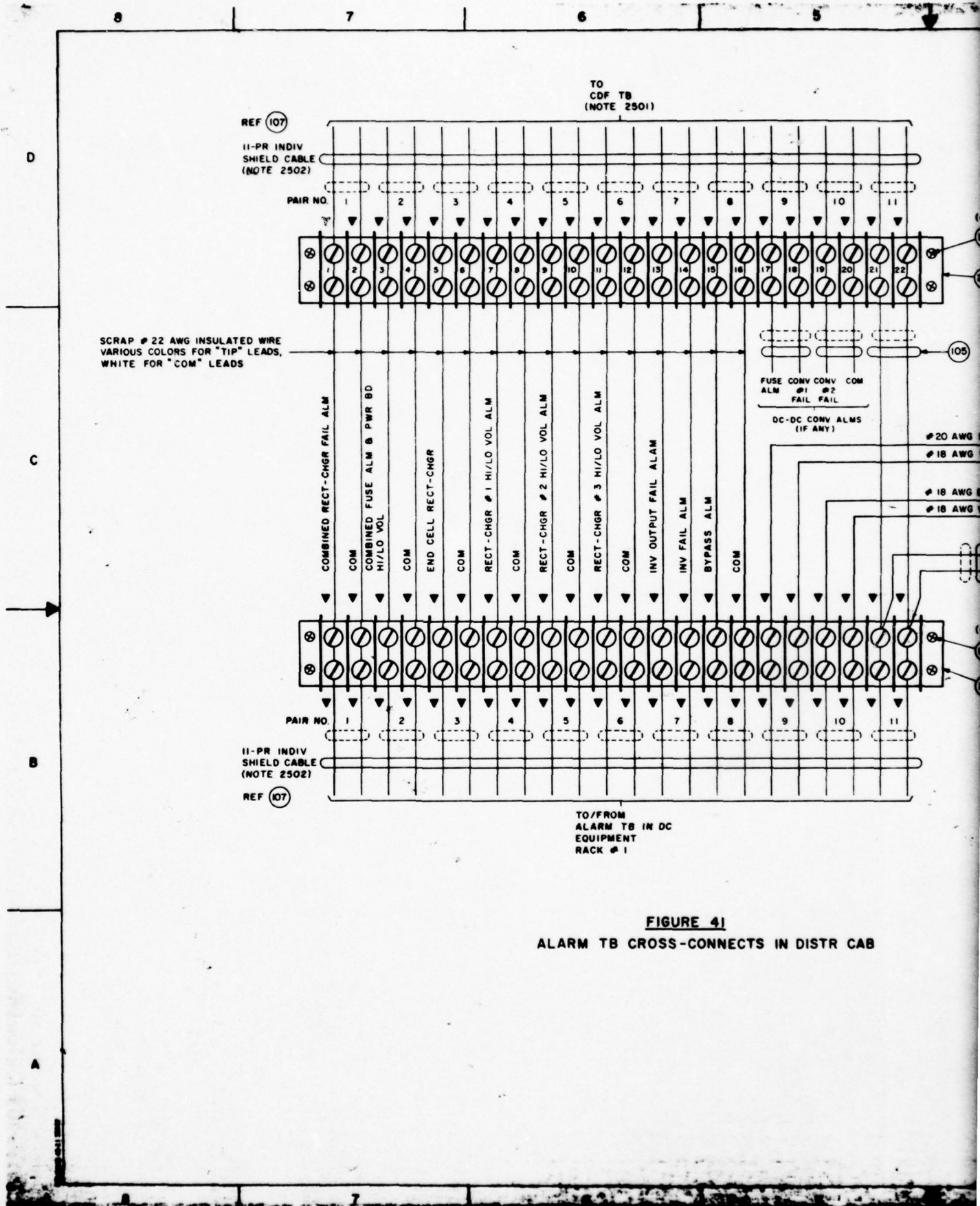


FIGURE 41
ALARM TB CROSS-CONNECTS IN DISTR CAB

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

LEGEND:

▼ INSTALLER SOLDER CONNECTIONS.

NOTES:

2501. LOCATION AND STENCILING OF CDF TERMINAL BLOCK WILL BE INCLUDED IN SITE EIP.
2502. NO. 22 AWG OVERALL OR INDIVIDUALLY SHIELDED PAIR CABLE IS SUITABLE.
2503. FOR INTERCOM USE. THE CABLE, JACKS, AND INTERCOM TERMINALS AT EACH END ARE NOT PROVIDED. SOUND-POWERED PHONES ARE SUITABLE TERMINALS.

(4 PL)

183 198 214 219

210

105

20 AWG BLU (-) FROM
18 AWG WHT (-) LOAD FUSE ALM RESISTOR
(+) AND RETURN BAR

18 AWG BLK (-) TO
18 AWG WHT (+) VOLTMETER SWITCH IN
DISTRIBUTION CABINET
VOLT/AMMETER PANEL
(SEE FIGURE 22 AND 30)

(NOTE 2503)

(4 PL)

183 198 214 219

210

STD-MS-0021

REVISION 15 OF 25

DATE 10/1/54

BY H. J. S. S. H.

DATE 10/1/54

BY D 50470

DATE 10/1/54

BY H. J. S. S. H.

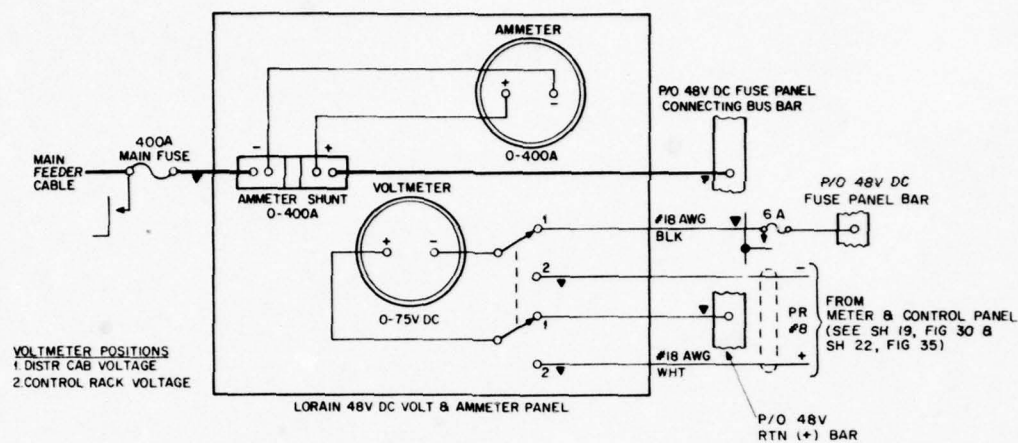


FIGURE 42
WIRING DIAGRAM OF 48 VOLT & AMMETER
PANEL IN DISTR CAB

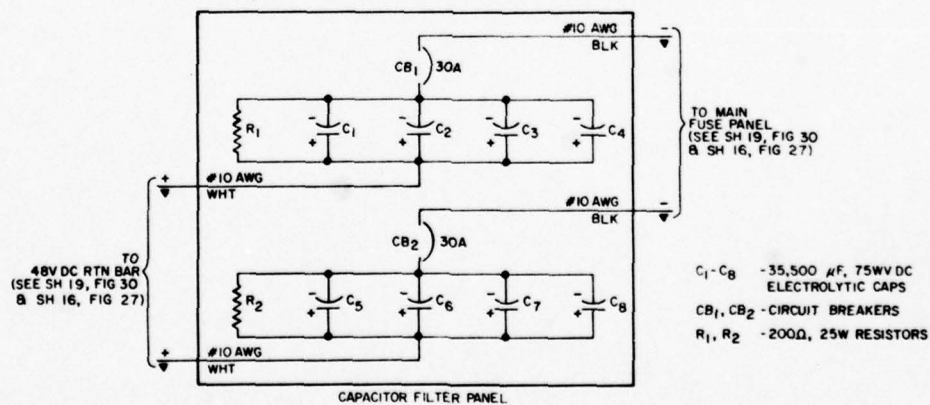
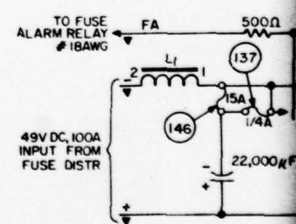


FIGURE 44
CAPACITOR FILTER PANEL
SCHEMATIC DIAGRAM



4

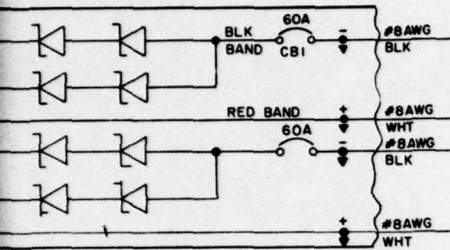
3

2

1

REVISION				
ZONE	REV	DESCRIPTION		DATE
				APPROVED

SELENIUM-COATED METAL PLATES,
2 ASSEMBLIES OF 6 PLATES EACH
5" X 6"



520V DC, 520A TRANSIENT PEAK LIMITER PANEL

D

C

B

A

FIGURE 43

520V DC, 520A TRANSIENT PEAK LIMITER
PANEL SCHEMATIC

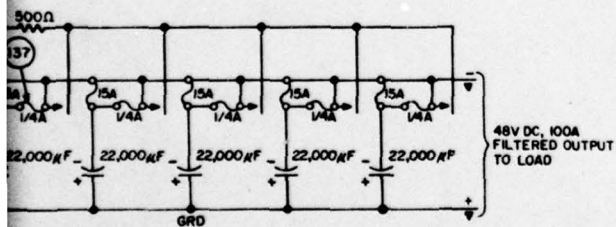


FIGURE 45

48V DC, 100A DC FILTER CIRCUIT

IDENT NO. STD-MS-0021		SIZE/PCB NO. 0 50470		DRAWING NO.	
SHEET 28 OF 28					
DRAWN BY L H LEE		SCALE NONE		SHEET OF	
APPROVED <i>[Signature]</i>					

4

3

2

1

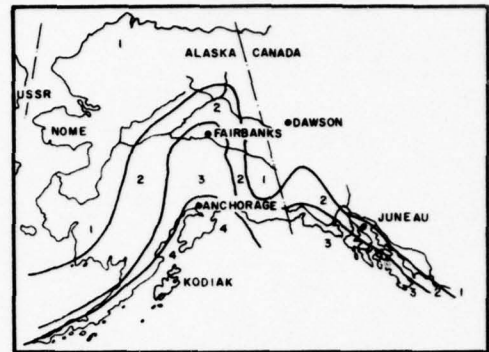
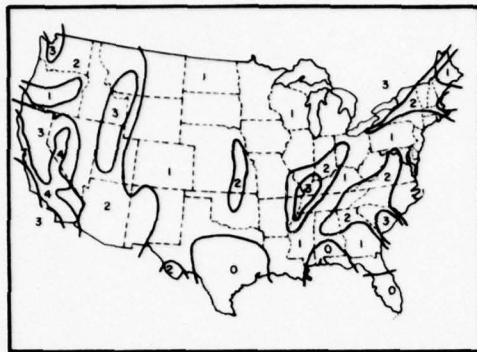


FIGURE 1
UNITED STATES SEISMIC ZONE MAP

REPRODUCED FROM THE 1976 EDITION OF THE UNIFORM BUILDING CODE, COPYRIGHT 1976, WITH PERMISSION OF THE PUBLISHERS, INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS.

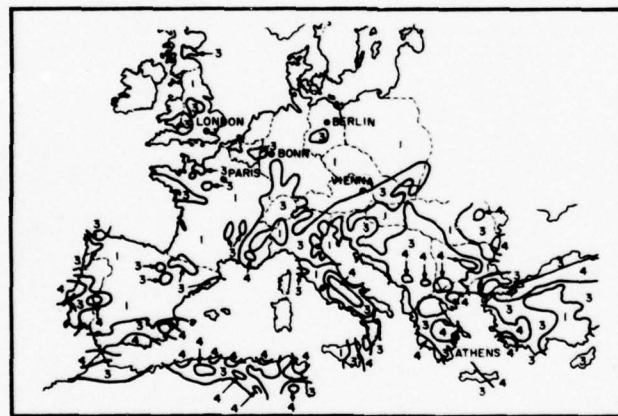


FIGURE 2
EUROPEAN SEISMIC ZONE MAP

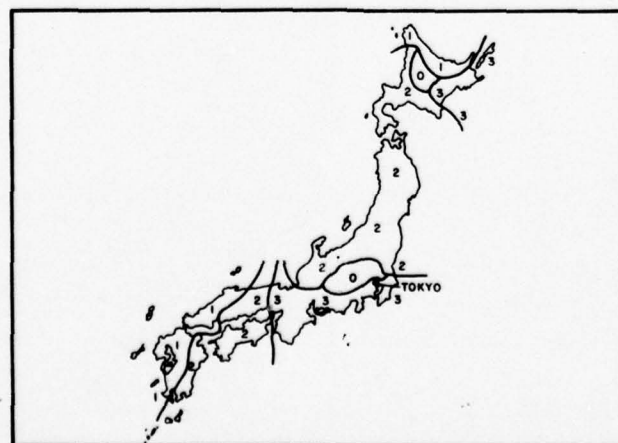
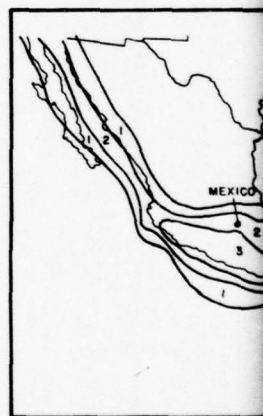


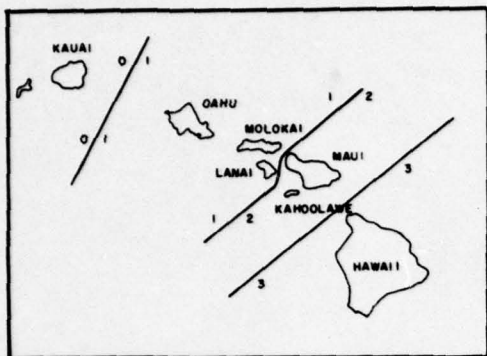
FIGURE 4
JAPANESE SEISMIC ZONE MAP



CENTRAL AMERICA



SOUTH CHINA



REVISION			
ZONE	REV	DESCRIPTION	DATE

LEGEND:

- ZONE 0 - NO DAMAGE.
- ZONE 1 - MINOR DAMAGE: DISTANT EARTHQUAKES MAY CAUSE DAMAGE TO STRUCTURE WITH FUNDAMENTAL PERIODS GREATER THAN 1.0 SECOND; CORRESPONDS TO INTENSITIES V AND VI OF THE MODIFIED MERCALLI INTENSITY SCALE OF 1931 (M.M.) SCALE.
- ZONE 2 - MODERATE DAMAGE: CORRESPONDS TO INTENSITY VII OF THE M.M. SCALE.
- ZONE 3 - MAJOR DAMAGE: CORRESPONDS TO INTENSITY VIII AND HIGHER OF THE M.M. SCALE.
- ZONE 4 - THOSE AREAS WITHIN ZONE NO. 3 DETERMINED BY THE PROXIMITY TO CERTAIN MAJOR FAULT SYSTEMS.

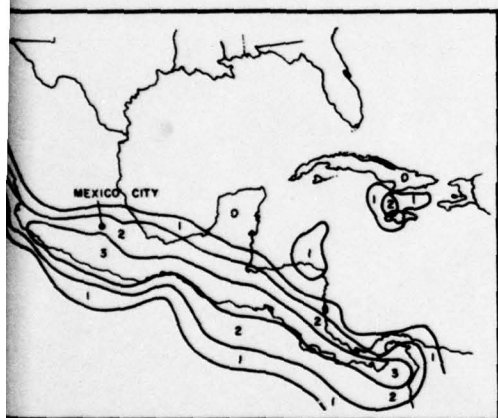


FIGURE 3

CENTRAL AMERICAN SEISMIC ZONE MAP

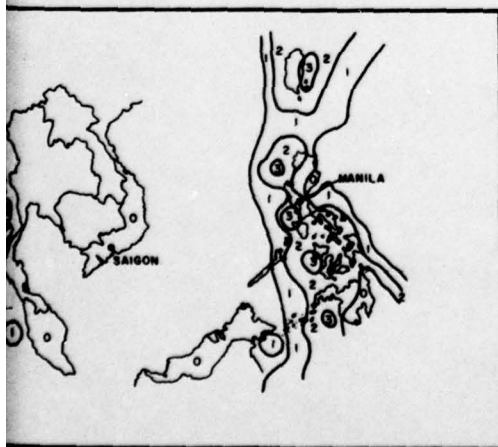


FIGURE 5

SOUTH CHINA SEA SEISMIC ZONE MAP

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
IDENT NO. STD-MS-0025		ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY			
SHEET 1 OF 1					
DESIGN BY	OTHERS	DATE			
DESIGN BY	S. D. H.	APR 79			
CHECKED BY	S. FENJEL	APR 79			
APPROVAL	ACTIVITY	SIZE	PCSB NO.	DRAWING NO.	
PROJECT	CCC-CEB-SRP	D	50470		
		SCALE	NONE	SHEET OF	

SECTION 5. BILL OF MATERIALS

5.1 GENERAL. The BOMs provided herein, figures 5-1 through 5-4, illustrate the essential materials required for the installation of the four types of 48-V dc battery power facilities described in paragraph 1.6. They are for a typical installation and should be modified and supplemented by the responsible engineering activity to fit the particular site. Cable duct and racks and bolt-down requirements should be determined on a site-by-site basis and added to items listed.

5.2 BILL OF MATERIALS. Each BOM contains USACC standard authorized materials which are to be used in the preparation of individual Engineering Installation Packages (EIPs). Requests for significant changes to the BOM will be submitted to Headquarters, USACEEIA, ATTN: CCC-CED-SEP, with justification for approval. Identification of items is primarily by National Stock Number (NSN), Management Control Number (MCN), and System Material List (SML). When military identification numbers are not available, the manufacturer's part description and number (or catalog number) with appropriate cost will be provided. The number in parentheses in the Stock Number column is the SML number.

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 50-A BASIC BATTERY FACILITY		DATE	
TELEPHONE NUMBER		STOCK NUMBER		PAGE NO. OF PAGES	
ITEM NO.	DESCRIPTION	UNIT	TOTAL AVAILABLE FOR PROJECT	REC'D	REC'D
1	NSNR (24832E) Battery Bank, Lead/Calcium-Acid, 23-Cell, 320 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C&D KC-9	EA	1	1	1
2	NSNR (24833F) Battery Bank, Lead/Calcium-Acid, 23-Cell, 340 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould MCX-340	EA			
3	NSNR (24834G) Battery Bank, Lead/Calcium-Acid, 23-Cell, 350 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide EC-9	EA			
4	NSNR (24835H) Battery Bank, Lead/Calcium-Acid, 23-Cell, 640 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C&D KC-17	EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility.

LOCATION				UNIT IDENT CODE			
SEIP 020				DATE			
TELER NUMBER				PAGE NO. NO. OF PAGES			
48-V Dc 50-A BASIC BATTERY FACILITY				2 19			
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE FOR PROJECT REQUIRE			
5	NSNR (24836W)	Battery Bank, Lead/Calcium-Acid, 23-Cell, 600 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-600	EA				
6	NSNR (24837Z)	Battery Bank, Lead/Calcium-Acid, 23-Cell, 620 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide EC-15	EA				
7	NSNR (24838A)	Battery Bank, Lead/Calcium-Acid, 23-Cell, 1,008 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C&D LCT-1008	EA				
8	NSNR (24839B)	Battery Bank, Lead/Calcium-Acid, 23-Cell, 1,008 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-1008	EA				

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 6071-R
1A-875

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE		PAGE NO. NO. OF	
TELEPHONE NUMBER		48-V Dc 50-A BASIC BATTERY FACILITY		DATE		PAGES	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL AVAILABLE FOR PROJECT	REQUIRED	
9	NSNR (24840B)	Battery Bank, Lead/Calcium-Acid, 23-Cell, 1,020 Ah, W/ 22-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 1/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numerical Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide 26C-11		EA			
10	NSNR (24841C)	Battery Rack, 2-Tier, C&D RD-801-6		EA			
11	NSNR (24842D)	Battery Rack, 2-Tier, C&D RD-801-9		EA			
12	NSNR (18132P)	Battery Rack, 2-Tier, C&D RD-901-9		EA			
13	NSNR (24843E)	Battery Rack, 2-Tier, Gould S07-078148		EA			
14	NSNR (24844F)	Battery Rack, 2-Tier, Gould S07-074478		EA			
15	NSNR (24845G)	Battery Rack, 2-Tier, Exide 80437-72		EA			
16	NSNR (24846H)	Battery Rack, 2-Tier, Exide 80440-108		EA			
17	NSNR (24847W)	Battery Rack, 2-Tier, Exide 84539-84		EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

L.A. 1 AUG 72 6071-4

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE FOR PROJECT	NO. OF PAGES
18	NSHR (248482)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-801-6-EPI	EA	4	19
19	NSHR (24849A)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-801-6-EPII	EA		
20	NSHR (24850A)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-801-9-EPI	EA		
21	NSHR (24851B)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-801-9-EPII	EA		
22	NSHR (24480Y)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-9-EPI	EA		
23	NSHR (24481N)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-9-EPII	EA		
24	NSHR (24852C)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Gould 507-078148-333	EA		
25	NSHR (24853D)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould 507-078148-666	EA		
26	NSHR (24854E)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Gould 507-074478-333	EA		
27	NSHR (24855F)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould 507-074478-666	EA		
28	NSHR (24856G)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints (2) 51218, Exide 80437-72	EA		

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd.).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 109-22, the proponent agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE		DATE		PAGE NO. 10	
TELE NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY						5	
ITEM NO.		STOCK NUMBER		NOMENCLATURE		UNIT		TOTAL AVAILABLE REQUIRED FOR PROJECT COMPLETION	
29	NSNR (24857H)			Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Exide 84133-72		EA			
30	NSNR (24858W)			Battery Rack, 2-Tier, Seismic Zone 1 Restraints (2) 51220, Exide 80440-108		EA			
31	NSNR (24859Z)			Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Exide 84136-108		EA			
32	NSNR (24471M)			Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84539-84		EA			
33	NSNR (24861A)			Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restraints, Exide 84786-84		EA			
34	NSNR (24862B)			Battery Rack, 2-Tier, Seismic Zone 4 Restraints, Exide 84753-84		EA			
35	NSNR (24864D)			Battery Rack, 2-Step, C & D RD-803-6		EA			
36	NSNR (24865E)			Battery Rack, 2-Step, C & D RD-803-9		EA			
37	NSNR (24866F)			Battery Rack, 2-Step, C & D RD-903-9		EA			
38	NSNR (24867G)			Battery Rack, 2-Step, Gould S07-078188		EA			
39	NSNR (24868H)			Battery Rack, 2-Step, Gould S07-074516		EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 75 5011-6

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see Air 102-22, the proponent agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELECOM NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY							
ITEM NO.	STOCK NUMBER	NONCUMENTURE		UNIT	TOTAL AVAILABLE FOR PROJECT		REQUIRE		
40	MSNR (24869A)	Battery Rack, 2-Step, Exide 80450-72		EA					
41	MSNR (24870J)	Battery Rack, 2-Step, Exide 80453-108		EA					
42	MSNR (24871Z)	Battery Rack, 2-Step, Exide 84556-84		EA					
43	MSNR (24872A)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-803-6-EPI		EA					
44	MSNR (248733)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-803-6-EPII		EA					
45	MSNR (24874C)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-803-9-EPI		EA					
46	MSNR (24875D)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-803-9-EPII		EA					
47	MSNR (24495K)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-9-EPI		EA					
48	MSNR (24496J)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-9-EPII		EA					
49	MSNR (248786)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Gould S07-078188-333		EA					
50	MSNR (24879H)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restraints, Gould S07-078188-666		EA					

UNIT 1 OF 1 AUG 72 IS OBSOLETE.

EDITION OF 1 NOV 72 IS OBSOLETE.

FORM 102-22 1071-R

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 103-22, the predecessor agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE		DATE		PAGE NO. 7	
TELE NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		NOMENCLATURE		UNIT		TOTAL AVAILABLE IN PROJECT FORWARD	
ITEM NO.	STOCK NUMBER								
51	NSNR (24880K)	Battery Rack, 2-Step, Seismic Zone 1		Restraints, Gould S07-074516-333		EA			
52	NSNR (24881J)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4		Restraints, Gould S07-074516-666		EA			
53	NSNR (24882Z)	Battery Rack, 2-Step, Seismic Zone 1		Restraints (2) 51218, Exide 80450-72		EA			
54	NSNR (24883A)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4		Restraints, Exide 81727-72		EA			
55	NSNR (24884B)	Battery Rack, 2-Step, Seismic Zone 1		Restraints (2) 51220, Exide 80453-108		EA			
56	NSNR (24885C)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4		Restraints, Exide 81730-108		EA			
57	NSNR (24886D)	Battery Rack, 2-Step, Seismic Zone 1		Restraints, Exide 84556-84		EA			
58	NSNR (24887E)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4		Restraints, Exide 84020-84		EA			
59	NSNR (24888F)	Battery Rack, 2-Step, Seismic Zone 4		Restraints, Exide 83987-84		EA			
60	NSNR (22112B)	Electrolyte, 5-Gal Container, 1.400 Specific Gravity				EA			
61	NSNR (22111A)	Electrolyte, 15-Gal Container, 1.400 Specific Gravity				EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 1A-970 5-11-8

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 16-22, the document printed in the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE		DATE		PAGE NO. OF PAGES	
TELECOM NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		NOMENCLATURE		UNIT		TOTAL AVAILABLE REQ FOR IN PROJECT	
ITEM NO.	STOCK NUMBER								
62	5915-00-236-7410 (22203E)	Filter, Decentralizing, 48-V DC, 25A, 19" X 5-1/4" Rack Mounting, Lorain #4826-075		EA					
63	NSMR (24415F)	Filter, Decentralizing, 48-V DC, 50A, 23" X 7" Rack Mounting, Lorain #4826-065		EA					
64	5920-00-878-4805 (18038K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Two 61-400A Fuse Positions, Lorain #4316-002		EA					
65	NSMR (24818C)	Fuse Panel, 48-V DC, 23" X 5-1/4", Seven 0-30A Fuse Positions, Lorain #4316-715		EA					
66	NSMR (23817B)	Fuse Panel, 48-V DC, 23" X 5-1/4", Four 0-30A & Sixteen 0-5A Fuse Positions, Equipped with Alarm Lamp and Relay, Lorain #4318-407		EA					
67	NSMR (21867Z)	Fuse Panel, 48-V DC, 23" X 1-3/4", Twenty-two 0-5A Type Fuses, Lorain #4318-405		EA					
68	NSMR (24408Z)	Inverter, 1-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #44A102B		EA					
69	NSMR (21851E)	Inverter, 500-VA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #44A501B		EA					
70	NSMR (22410C)	Kit, Emergency Battery Safety		EA					

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 1 APR 78 5011-6

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 103-22, the present policy in the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELER NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		DATE		PAGE NO.		NO. OF	
ITEM NO.		STOCK NUMBER		NONENCLATURE		TOTAL AVAILABLE REQ FOR PROJECT COMMAND		IN REQUIRED	
71		NSNR (248190)		Meter Panel Assembly, Consisting of:					
				Meter Panel, 23" X 5-1/4", 48-V DC, Rack Mounting; Equipped					
				With a 0- to 75-Volt DC Voltmeter (1% Accuracy) Lorain					
				#4374-037					
		6625-00-078-9012 (248200)		Ammeter, 0- to 75-Amp, Lorain #2925-772					
		NSNR (24821E)		Ammeter Shunt, 75 A, Lorain #2982-711					
72		5975-00-001-3525 (222020)		Rack, Relay, 23" X 7', With 4 Cable Brackets Per Rack, Lorain #4124-010					
73		NSNR (24822F)		Rectifier-Charger, 48-V DC, 50A; 1 Ø, 120/240 V AC, 50/60 Hz; Lorain #RL50F50					
74		NSNR (24823G)		Switch, Safety, Unfused Knife Blade, 2-Pole, 240 V AC, 60 A, NEMA 1 Indoor Enclosure, Wall Mounting, Square D Type Q026ONATS					
75		5975-00-710-0876 (21705C)		Bushing, 2" OD, Chase Nipple, T88 #1947					
76		6145-00-845-5206 (15104A)		Cable, 1-Pr, #20 AWG, Str, Ins					
77		NSNR (21717D)		Cable, 3-Pr, #22, Str, Belden #9745					

FORM 1 APR 58 6011-1

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd):

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 50-A BASIC BATTERY FACILITY		DATE	
For use of this form, see AR 100-22, the predecessor of the United States Army Communications Command.		STOCK NUMBER		PAGE NO. 10	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE FOR PROJECT	NO. OF PAGES
78	6145-00-081-1049 (20993E)	Cable, Indiv Shld Cond, 11-Pr, #22 AWG, Sol, W/Gnd Wire, Beiden #8765	FT		9
79	NSNR (23985E)	Cable, Single Cond., #6 AWG, Yel, Str, 600 V, Anixter #68-0601	FT		
80	6145-00-051-9790 (03516S)	Cable, Single Cond, #2 AWG, Blk, Str	FT		
81	6145-00-184-3875 (03499A)	Cable, Single Cond, #2 AWG, Wht, Str	FT		
82	NSNR (24224H)	Cable, Single Cond, Str, Ins, 600V, #1/0 AWG, Wht, Anixter #60-1011 White	FT		
83	6145-00-184-5498 (03524D)	Cable, Single Cond, Str, Ins, 600V, #1/0 AWG, Blk	FT		
84	NSNR (24404F)	Capacitor Filter Panel, 23" X 7", For 48V DC, IAW Dwg STD-NS-0003	EA		
85	NSNR (21819G)	Compound, Sealing, Nonhardening Permagum	BG		
86	NSNR (21725A)	Copper Strip, 1/2" Wide, 5" Long, 1/32" Thick	EA		
87	5340-00-754-4560 (00740C)	Expansion, Shield, 3/8" -16, Mach Bolt	EA		
88	5920-00-901-9936 (103330)	Fuse, GMT 1, 1A	EA		
89	5920-00-857-8933 (24424D)	Fuse, GMT 2, 2A	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 100-22-1

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

LOCATION				UNIT IDENT CODE			
SEIP 020				DATE			
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				PAGE NO. 11			
48-V DC. 50-A BASIC BATTERY FACILITY				TOTAL AVAILABLE PROJECT EQUIP			
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	DATE	UNIT	DATE	UNIT
90	5920-00-081-5958 (16582Y)	Fuse, GMT 3, 3A	EA				
91	5920-01-056-7256 (24425E)	Fuse, GMT 3-1/2, 3-1/2A	EA				
92	5920-00-857-8417 (17144N)	Fuse, GMT 5, 5A	EA				
93	NSVR (24831D)	Fuse, GMT 10, 10A, Lorain #2486-112	EA				
94	5920-00-156-0838 (14624E)	Fuse, Grasshopper, 1-1/3A, Bussman 35B	EA				
95	5920-00-556-9728 (24430J)	Fuse, Grasshopper, 2A, Bussman 35L	EA				
96	5920-00-156-0837 (16432K)	Fuse, Grasshopper, 3A, Bussman 35G	EA				
97	5920-00-122-3775 (17237Z)	Fuse, Grasshopper, 5A, Bussman 35H	EA				
98	5920-00-857-8418 (24431Z)	Fuse, Grasshopper, 7-1/2A, GTE D27087A11	EA				
99	5920-00-624-2661 (24432A)	Fuse, Grasshopper, 10A, Burndy FILOIT5	EA				
100	5920-00-539-6347 (24426F)	Fuse, Indicating, Type 70, 1-1/3A	EA				

EDITION OF 1 AUG 72 IS OBSOLETE.

LA 1 APR 78 6:11-R

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS											
For use of this form, see AR 102-22, the Proponent Policy is the United States Army Communications Command.											
UNIT IDENT CODE											
SEIP 020											
48-V DC, 50-A BASIC BATTERY FACILITY											
TELECOM NUMBER		STOCK NUMBER		NOMENCLATURE		DATE		PAGE NO. 12		NO. OF PAGES 19	
ITEM NO.								UNIT	TOTAL AVAILABLE PROJECT REQUIREMENTS		
101	5920-00-284-9217 (244276)	Fuse, Indicating, Type 70, 2A						EA			
102	5920-00-284-9218 (24428H)	Fuse, Indicating, Type 70, 3A						EA			
103	5920-00-538-6205 (23988H)	Fuse, Indicating, Type 70, 5A						EA			
104	NSNR (24429W)	Fuse, Indicating, Type 70, 1/4A with 10 Ohm Resistor in Series 250 V, Loran #2486-203						EA			
105	5920-00-665-0515 (24441J)	Fuse, 3AB, Alarm, 1A, Buss						EA			
106	5920-00-195-2330 (24442Z)	Fuse, 3AB, Alarm, 1A, Littlefuse						EA			
107	5920-00-295-7013 (24443A)	Fuse, 3AB, Alarm, 2A, Buss						EA			
108	5920-01-007-5676 (24444B)	Fuse, 3AB, Alarm, 2A, Littlefuse						EA			
109	5920-00-503-4843 (24445C)	Fuse, 3AB, Alarm 3A, Buss						EA			
110	5920-00-133-4898 (24446D)	Fuse, 3AB, Alarm, 3A, Littlefuse						EA			
111	5920-00-806-3152 (24447E)	Fuse, 3AB, Alarm, 4A, Buss						EA			

EDITION 1 AUG 72 IS OBSOLETE.

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 3-71-8

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AIT 10-22, the predecessor to this form, in the United States Army Communications Command.									
UNIT ID, NT C-02		DATE		PAGE NO.		NO. OF PAGES			
SEIP 020				13		19			
TECH. NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY							
ITEM NO.	STOCK NUMBER	NOMENCLATURE							
112	5920-01-007-5677 (24448F)	Fuse, 3AB, Alarm, 5A, Littlefuse							
113	NSNR (24449G)	Fuse, 3AB, 15A, 250 V, Littlefuse 314015							
114	NSNR (24433B)	Fuse, 5AB, Normal, 1A, Littlefuse 512001							
115	NSNR (24434C)	Fuse, 5AG, Normal, 2A, Littlefuse 512002							
116	NSNR (24435D)	Fuse, 5AG, Normal, 3A, Littlefuse 512003							
117	5920-00-280-3469 (21724Z)	Fuse, 5AG, Normal, 5A, Littlefuse 512005							
118	NSNR (24436E)	Fuse, 5AG, Normal, 8A, Littlefuse 512008							
119	NSNR (24437F)	Fuse, 5AB, Normal, 10A, Littlefuse 514010							
120	NSNR (24438G)	Fuse, 5AB, Normal, 15A, Littlefuse 514015							
121	NSNR (24439H)	Fuse, 5AB, S10-B10, 5A, Littlefuse 523005							
122	NSNR (21723W)	Fuse, 5AB, S10-B10, 10A, Littlefuse 523010							
123	NSNR (24440K)	Fuse, 5AB, S10-B10, 15A, Littlefuse 523015							

EDITION OF 1 AUG 72 IS OBSOLETE.

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 3371-R
1 APR 78

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS			
Per use of this form, see A-1, 16A-22, and information at top of this Bill of Materials. Controlling Office: 19			
SEIP 020		DATE	
48-V DC, 50-A BASIC BATTERY FACILITY		14	
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT
124	NSNR (24825W)	Fuse, One-Time, Non-Type, Cartridge, 3A, 250V, Lorain #2483-503	EA
125	NSNR (24047A)	Fuse, One-Time, Non-Type, Cartridge, 6A, 250V, Lorain #2483-505	EA
126	NSNR (13042R)	Fuse, One-Time, Non-Type, Cartridge, 10A, 250V, Lorain #2483-507	EA
127	NSNR (18041X)	Fuse, One-Time, Non-Type, Cartridge, 15A, 250V, Lorain #2483-509	EA
128	NSNR (21837C)	Fuse, One-Time, Non-Type, Cartridge, 20A, 250V, Lorain #2483-511	EA
129	NSNR (24048B)	Fuse, One-Time, Non-Type, Cartridge, 25A, 250V, Lorain #2403-513	EA
130	NSNR (21698F)	Fuse, One-Time, Non-Type, Cartridge, 30A, 250V, Lorain #2483-515	EA
131	5920-00-904-2671 (180430)	Fuse, Type 70 (Indicating/Alarm) 1-1/3A, Lorain #2486-208	EA
132	5920-00-067-6783 (24826Z)	Fuse, Link, 70A, 250V, Lorain #2484-625	EA
133	NSNR (22172N)	Fuse, Link 100A, 250V, Lorain #2484-631	EA
134	NSNR (24827A)	Fuse Alarm Relay and Lamp Assembly, Lorain #4265-019	EA
TOTAL AVAILABLE IN STOCK			
TOTAL PROJECT REQUIREMENT			

EDITION OF 1 AUG 72 IS OBSOLETE

DA FORM 1 APR 76 3071-R

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

UNIT IDENT CODE			
TELEPHONE NUMBER	SETUP CODE	48-V DC, 50-A BASIC BATTERY FACILITY	DATE
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT
135	NSNR (21729E)	Fuse Block, For 5AG Fuses, 10 Poles, Screw Terminals, Littlefuse #556010	EA
136	NSNR (21836B)	Ground Bar, Copper, 400A, 23" Mtg, Lorain #4361-040	EA
137	5940-00-J01-3520 (21712W)	Ground Terminal Strip, Lorain #4835-530	EA
138	NSNR (21695C)	Heat Baffle, 23" x 3-1/2", Lorain #4133-024	EA
139	NSNR (23313D)	Insulating Mounting Assembly for 23" Ground Bar, 4", Lorain #4133-036	EA
140	NSNR (21726B)	Jumper, Square D, Type 9080-JCA-6	EA
141	5975-00-642-7263 (02622D)	Locknut, Conduit, 2", T&B #146	EA
142	5940-00-J01-3498 (21710G)	Lug Adapter, Angle, Lorain #3627-531	EA
143	5180-00-J01-3522 (21708F)	Lug Kit, #14-4 AWG, Lorain #4835-523	EA
144	5180-00-J01-3523 (21824A)	Lug Kit, #4-3/0 AWG, Lorain #4835-526	EA
145	5940-00-848-8847 (21720F)	Lug, Terminal, #22 AWG, T&B STA-KON, RA-1123	EA
146	5940-00-866-2586 (21955Z)	Lug, Terminal, #10 AWG, 1/4" Bolt, T&B #RC10-14	EA

TOTAL
PROJECT
REQUIRES
FORWARD

PAGE NO. 15
PAGE 19

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd.).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 16-22, the Department of Defense, the United States Army, Customs, and Patent Commission.									
UNIT IDENT CODE									
SEIP 020									
48-V DC, 50-A BASIC BATTERY FACILITY									
ITEM NO.	STOCK NUMBER	NOMENCLATURE				UNIT	TOTAL AVAILABLE	REQ FOR PROJECT	REQUIRE
147	NSNR (23942F)	Mounting Channel, Square D, Type 1828-C22X38				EA	16		
148	5310-00-550-2490 (07675L)	Nut, Plain, Hex, Steel, Cad Pltd, #8-32				EA			
149	5310-00-285-1650 (00558H)	Nut, Plain, Hex, Steel, Cad Pltd, 1/4-20				EA			
150	NSNR (20942W)	Panel, Blank, 23" X 1-3/4", Lorain #3531-106				EA			
151	NSNR (20961F)	Panel, Blank, 23" X 3-1/2", Lorain #3532-112				EA			
152	5975-00-101-3512 (20979C)	Panel, Blank, 23" X 5-1/4", Lorain #3533-106				EA			
153	5975-00-101-3513 (20960E)	Panel, Blank, 23" X 7", Lorain #3534-103				EA			
154	6130-00-177-3097 (24829C)	Panel, Low Voltage Disconnect, 23" X 3-1/2", 100 A, Lorain #4863-718				EA			
155	NSNR (24828B)	Panel, Termination, 23" X 3-1/2", 100A, Lorain #4341-036				EA			
156	NSNR (21846A)	Protective Screening for Dc Control Rack 23" Wide X 36" High, Lorain #4141-406				EA			
157	NSNR (21841F)	Rack Adapter Kit, 19" to 23" X 5-1/4", Lorain #3571-311				EA			
158	5305-00-206-3713 (09098X)	Screw, Mach, Pan Hd, Steel, Cad Pltd, 8-32 X 1" Lg				EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 3071-2
1 APR 75

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELEPHONE NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
				UNIT	
				TOTAL AVAILABLE IN PROJECT	
				TOTAL REQUIRED FOR PROJECT	
				PAGE NO. 17	
				PAGE NO. 19	
159	5305-00-639-7970 (13953E)	Screw, Mach, 12-24 X 3/4", Pan Hd		EA	
160	5305-00-988-1727 (10130J)	Screw, Mach, Steel, Cad Pltd, 1/4-20 X 1" Lg		EA	
161	5305-00-022-7798 (00230J)	Screw, Cap, 3/8-16 X 1-1/2", Hex Hd, Steel		EA	
162	5970-00-295-8161 (23204E)	Tape, Insulating, Elec, White, 3/4" Wide X 216', 1500 V		RL	
163	5970-00-816-6056 (13561K)	Tape, Insulating, Elec, Black 3/4" Wide X 108 In		RL	
164	5820-00-001-3310 (21956A)	Terminal Block, Square D, Type 9080-CA-10		EA	
165	NSNR (23199Z)	Terminal Strip, Barrier, Twin-Screw, 22 Positions, Curtis #1522 ST		EA	
166	NSNR (24830C)	Transient Peak Limiter, 23" X 7" (One Carl E. Holmes Co SS20HX3EC1 Limiter With 40A CB) IAW Dwg STD-HS-0023		EA	
167	5310-00-167-0833 (00487C)	Washer, Flat, Steel, Cad Pltd, #8		EA	
168	5310-00-141-1795 (14518K)	Washer, Flat, Steel, Cad Pltd, 1/4"		EA	
169	5310-00-087-7493 (08658A)	Washer, Flat, Steel, 3/8"		EA	

NOTE: FOR 1 AUG 72 IS COMPLETE.

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd.).

SEIP 020		UNIT IDENT CODE		PAGE NO. 18		NO. OF PAGES 9	
TELECOM NUMBER		48-V DC, 50-A BASIC BATTERY FACILITY		DATE		TOTAL AVAILABLE FOR PROJECT COMMAND	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	REQUIRE		
170	5310-00-045-3299 (09019J)	Washer, Lock, Split, Steel, Cad Pltd, #8		EA			
171	5310-00-808-5381 (10231A)	Washer, Lock, Split, Steel, Cad Pltd, 1/4"		EA			
172	5310-00-637-9541 (00586C)	Washer, Lock, Split, Steel, 3/8"		EA			
173	NSHR (15954C)	Wire, Elec, Tw, #20 AWG, Blu, Str, Ins, 600V, Belden #8919-13		FT			
174	6145-00-681-8374 (09217J)	Wire, Elec, Tw, #18 AWG, Wht, Str, Ins		FT			
175	6145-00-524-9130 (23193Y)	Wire, Elec, Tw, #18 AWG, Blk, Str, Ins		FT			
176	6145-00-089-6811 (11672A)	Wire, Elec, Tw, #18 AWG, Red, Str, Ins		FT			
177	6145-00-050-7405 (03540K)	Wire, #14 AWG, Blk, Sol, 600V, Ins		FT			
178	6145-00-050-7407 (03509A)	Wire, #14 AWG, Wht, Sol, 600V, Ins		FT			
179	6145-00-990-3000 (03507W)	Wire, Single Cond, #10 AWG, Wht, Sol, Ins, 600V		FT			
180	6145-00-990-2999 (03538G)	Wire, Single Cond, #10 AWG, Blk, Sol, Ins, 600V		FT			
181	6145-00-479-0042 (06535A)	Wire, Single Cond, #8 AWG, Wht, Sol, Ins, 600V		FT			

EDITION OF 1 AUG 72 IS OBSOLETE.

LA FORM 1 APR 72 3071-A

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see DA Form 3071-R, 1 Apr 78, and the instructions on the back of this form.				DATE	PAGE NO. OF 19
48-V DC, 50-A BASIC BATTERY FACILITY				UNIT	TOTAL AMOUNT REQUIRED FOR PROJECT COMMAND
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AMOUNT REQUIRED FOR PROJECT COMMAND	PAGE NO. OF 19
182	6145-00-470-8255 (03570N)	Wire, Single Cond, #8 AWG, Blk, Sol, Ins, 600V	FT		
183	6145-00-949-5200 (11674C)	Wire, Elec, Tw, Str, #4 AWG, Wht, Ins, 600V	FT		
184	6145-00-939-4948 (06906H)	Wire, Elec, Tw, Str, #4 AWG, Blk, Ins, 600V	FT		
185	NSNR (21825B)	Bus Bar, Term Panel to Charge/Discharge Fuse Panel, Lorain 3425-194	EA		

DA FORM 3071-R
1 APR 78

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials for 48-V Dc 50-A Basic Battery Facility (Contd).

SECTION		SEIP 020		UNIT IDENT CODE	
TELE NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL AVAILABLE FOR PROJECT	PAGE NO. NO. OF PAGES
1	NSNR (249618)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 433 Ah, W/ 5-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D 4LCV-7	EA	1	20
2	NSNR (24962C)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 380 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould MCX-380	EA		
3	NSNR (24963D)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 360 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide EU-7	EA		
4	NSNR (24894A)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 840 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-840	EA		

DA FORM 341-1

UNIT FOR FACILITY 01010111

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility.

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see AR 103-22, and Appendix 1, Army and Air Force Communications Command				DATE	PAGE NO. 2
LOCATION	SEIP 020	48-V DC, 100-A CEMF CELL BATTERY FACILITY		UNIT	TOTAL AVAILABLE PROJECT REQUIREC
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	DATE	PAGE NO. 2
5	NSNR (24964E)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 672 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-672	EA		20
6	NSNR (24896C)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 860 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide 26C-9	EA		
7	NSNR (24965F)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,008 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-1008	EA		
8	NSNR (24966G)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,050 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 4/0 Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-1050	EA		

LITING OF 1 AUG 72 IS OBSOLETE

FORM 100-100-1

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

7-150 60000-1

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd.).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
Per use of this form, the AR 100-22 and 100-23 are hereby authorized to be used by the United States Army Communications Command.				DATE	PAGE NO.
SEIP 020				4	20
48-V DC, 100-A CEMF CELL BATTERY FACILITY					
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	QUANTITY	REMARKS
18	NSNR (24420Y)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restrains, C & D RD-901-9-EPI	EA		
19	NSNR (24401N)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restrains, C & D RD-901-9-EPI	EA		
20	NSNR (24973C)	Battery Rack, 2-Tier, Seismic Zone 1 Restrains, Gould S07-078150-333	EA		
21	NSNR (24974D)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restrains, Gould S07-078150-666	EA		
22	NSNR (24917C)	Battery Rack, 2-Tier, Seismic Zone 1 Restrains, Gould S07-074478-333	EA		
23	NSNR (24918D)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restrains, Gould S07-074478-666	EA		
24	NSNR (24975E)	Battery Rack, 2-Tier, Seismic Zone 1 Restrains (2) 77406, Exide 80438-84	EA		
25	NSNR (24976F)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restrains, Exide 84135-84	EA		
26	NSNR (24923H)	Battery Rack, 2-Tier, Seismic Zone 1 Restrains, Exide 84539-94	EA		
27	NSNR (24924W)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restrains, Exide 84786-84	EA		
28	NSNR (24925Z)	Battery Rack, 2-Tier, Seismic Zone 4 Restrains, Exide 84753-84	EA		

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AIT 100-22, the document which is the United States Army Communications Command.									
SECTION		SEIP 020		UNIT IDENT CODE		PAGE NO.		DATE	
TELEPHONE		48-V DC, 100-A CEMF CELL BATTERY FACILITY		NOMENCLATURE		UNIT		DATE	
ITEM NO.	STOCK NUMBER								
29	MSNR (24977G)	Battery Rack, 2-Step, C & D RD-903-3		EA					
30	MSNR (24966F)	Battery Rack, 2-Step, C & D RD-903-9		EA					
31	MSNR (24978H)	Battery Rack, 2-Step, Gould S07-078190		EA					
32	MSNR (24932F)	Battery Rack, 2-Step, Gould S07-074516		EA					
33	MSNR (24979K)	Battery Rack, 2-Step, Exide 80451-84		EA					
34	MSNR (24935K)	Battery Rack, 2-Step, Exide 84556-84		EA					
35	MSNR (24980Z)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restrains, C & D RD-903-3-EPI		EA					
36	MSNR (24981Z)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restrains, C & D RD-903-3-EPII		EA					
37	MSNR (24495K)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restrains, C & D RD-903-9-EPI		EA					
38	MSNR (24496J)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restrains, C & D RD-903-9-EPII		EA					
39	MSNR (24982A)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Gould S07-078190-333		EA					

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS

For use of this form, see AF 102-22, and Distribution Statement, in the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE			
TELEPHONE NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE			
ITEM NO.	STOCK NUMBER	NOMENCLATURE					
40	NSNR (24983B)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restrains, Gould S07-078190-666					
41	NSNR (24943F)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Gould S07-074516-333					
42	NSNR (24944G)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restrains, Gould S07-074516-666					
43	NSNR (24984C)	Battery Rack, 2-Step, Seismic Zone 1 Restrains (2) 77046, Exide 80451-84					
44	NSNR (24985D)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restrains, Exide 81729-96					
45	NSNR (24949B)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Exide 84556-84					
46	NSNR (24897E)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restrains, Exide 84020-84					
47	NSNR (24951C)	Battery Rack, 2-Step, Seismic Zone 4 Restrains, Exide 83987-84					
48	NSNR (24986E)	CEMF Cell Panel, 3V, 160A, 23" X 8-3/4", Lorain #4627-302					
49	NSNR (24987F)	Circuit Breaker Enclosure, 20" X 30" X 6-5/8", Equipped With 2-50A Main, 2-15A, 2-10A, and 20-5A DC Breakers, 100A Rtn Bus Bar, and Termination For 4/0 AWG Cable, Curtis Industries 271C8.					

EDITION OF 1 AUG 72 IS OBSOLETE

FIGURE 5-2
3971-1

EDITION OF 1 AUG 72 IS OBSOLETE

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd)

LOCATION		SEIP 020		UNIT IDENT CODE	
TELEPHONE NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	EA
50	6130-00-177-3097 (24329C)	Disconnect Panel, Low-Voltage, 23" X 3-1/2", 100A, Lorain #4863-718		EA	EA
51	NSNR (22112B)	Electrolyte, 5-Gal Container, 1.400 Specific Gravity		EA	EA
52	NSNR (22111A)	Electrolyte, 15-Gal Container, 1.400 Specific Gravity		EA	EA
53	NSNR (24415F)	Filter, Decentralizing, 48-V DC, 50A, 23" X 7" Rack Mounting, Lorain #4826-065		EA	EA
54	5920-00-156-3681 (24401C)	Fuse Panel, 48-V DC, 23" X 10-1/2", Four 61-400A Fuse Positions, Lorain #4317-012		EA	EA
55	5920-00-878-4805 (18038K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Two 61-400A Fuse Positions, Lorain #4316-002		EA	EA
56	NSNR (21942H)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 31-60A Fuse Positions, Lorain #4317-009		EA	EA
57	NSNR (24129F)	Fuse Panel, 48-V DC, 23" X 5-1/4", Four 0-30A & Four 31-60A Fuse Positions, Lorain #4317-010		EA	EA
58	5920-00-878-4817 (18159K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 0-30A Fuse Positions, Lorain #4317-008		EA	EA
59	NSNR (21867Z)	Fuse Panel, 48-V DC, 23" X 1-3/4", Twenty-two 0-5A Fuse Positions, Lorain #4318-405		EA	EA
60	NSNR (24409A)	Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #XAA202B		EA	EA
61	NSNR (24410A)	Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 50/60 Hz, Lorain #XWBG202B1		EA	EA

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 1 SEP 70 601-1-1

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd.).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		UNIT IDENT CODE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	PAGE NO. AND OF PAGES	TOTAL EVALUATION REQUIRED FOR THIS PROJECT
62	NSNR (24408Z)	Inverter, 1-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA102B	EA	8	20
63	NSNR (21851E)	Inverter, 500-VA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA501B	EA		
64	NSNR (22410C)	Kit, Emergency Battery Safety	EA		
65		Meter Panel Assembly, Consisting of: Meter Panel, 23" X 8-3/4", 48-V DC, Rack Mounting; Equipped With a 0- to 75-Volt DC Voltmeter (1% Accuracy) Lorain #4374-061	EA		
	NSNR (24988G)	Ammeter, 0- to 150-Amp, Lorain #2925-774	EA		
	NSNR (24989H)	Ammeter Shunt, 150-Amp, Lorain #2982-713	EA		
66	5975-00-J01-3525 (22202D)	Rack, Relay, 23" X 7", With 4 Cable Brackets Per Rack, Lorain #4124-010	EA		
67	NSNR (24990K)	Rectifier-Charger, 48-V DC, 100A; 3 Ø, 208 V AC, 60 Hz; Lorain #RHW100D50	EA		
68	NSNR (24991J)	Rectifier-Charger, 48-V DC, 100A; 3 Ø, 380 V AC, 50/60 Hz; Lorain #RHW100C50	EA		
69	NSNR (24992Z)	Shunt and Contactor Panel Assembly, 100A, 23" X 3-1/2" Consisting of: Contactor, Lorain #4377-009	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd.).

LOCATION			SEIP 020		UNIT IDENT CODE	
TELECOM NUMBER			48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.			STOCK NUMBER		PAGE NO. NO OF PAGES	
					9 20	
					TOTAL AVAILABLE PROJECT FORWARD	
					UNIT	
			NSNR (18157M)	Panel, Mounting Lorain #3532-162	EA	
			5905-00-758-5449 (24993A)	Meter Shunt, 100A Lorain #2982-712	EA	
70			NSNR (24823G)	Switch, Safety, Unfused Knife Blade, 2-Pole, 240 V AC, 60 A, NEMA 1 Indoor Enclosure, Wall Mounting, Square D Type 00260NATS	EA	
71			NSNR (21825B)	Bus Bar, Term Panel to Charge/Discharge Fuse Panel, Lorain #3425-194	EA	
72			5975-00-710-0876 (21705C)	Bushing, 2" OD, Chase Nipple, T&B #1947	EA	
73			6145-00-845-5206 (15104A)	Cable, 1-Pr, #20 AWG, Str, Ins	FT	
74			NSNR (21717D)	Cable, 3-Pr, #22, Str, Belden #9745	FT	
75			6145-00-081-1049 (20993E)	Cable, Indiv Shld Cond, 11-Pr, #22 AWG, Sol, W/Gnd Wire, Belden #8765	FT	
76			6145-00-051-9790 (03516G)	Cable, Single Cond, #2 AWG, B1k, Str	FT	
77			6145-00-184-3875 (03499A)	Cable, Single Cond, #2 AWG, Wht, Str	FT	
78			NSNR (21707E)	Cable, Single Cond, Str, Ins, 600V, #4/0 AWG, Wht, Anixter #38-4041	FT	
79			6145-00-050-9079 (24863C)	Cable, Single Cond, Str, Ins, 600V, #4/0 AWG, B1k	FT	

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AF 10-122, The Department of Defense, in the United States Army Communications Community									
UNIT IDENT CODE									
SEIP 020									
ITEM NO.	STOCK NUMBER	NOMENCLATURE				DATE	PAGE NO.	TOTAL REQ FOR PROJECT COMMAND	REQUIREC
80	6145-00-689-9338 (14823F)	Cable, 2-Cond, Str, Ins, #16 AWG, Belden 8471				FT	10	20	
81	6145-00-584-7974 (11474A)	Cable, 3-Cond, Str, Ins, #16 AWG, Belden 9219				FT			
82	NSNR (24404F)	Capacitor Filter Panel, 23" X 7", For 48V DC, IAW " "				EA			
83	NSNR (21819G)	Compound, Sealing, Nonhardening Permagum				BG			
84	5940-00-257-1215 (21394N)	Connector, Two-Way, #2/O AWG-4/O AWG, T88 #32511				EA			
85	NSNR (21725A)	Copper Strip, 1/2" Wide, 5" Long, 1/32" Thick				EA			
86	5340-00-754-4560 (00740C)	Expansion, Shield, 3/8" -16, Mach Bolt				EA			
87	5920-00-901-9936 (10333D)	Fuse, GMT 1, 1A				EA			
88	5920-00-857-8933 (24424D)	Fuse, GMT 2, 2A				EA			
89	5920-00-081-5958 (16582Y)	Fuse, GMT 3, 3A				EA			
90	5920-01-056-7256 (24425E)	Fuse, GMT 3-1/2, 3-1/2A				EA			
91	5920-00-857-8417 (17144N)	Fuse, GMT 5, 5A				EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 78 3371-3

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 105-22; the procuring agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELER NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE		PAGE NO.		NO. OF PAGES	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL PROJECT REQUIRED	AVAILABLE PROJECT COMMAND	REQUIRED		
92	NSIR (24831D)	Fuse, GMT 10, 10A, Lorain #2486-112		EA					
93	5920-00-156-0838 (14624E)	Fuse, Grasshopper, 1-1/3A, Bussman 35B		EA					
94	5920-00-556-9728 (24430J)	Fuse, Grasshopper, 2A, Bussman 35L		EA					
95	5920-00-156-0837 (16432K)	Fuse, Grasshopper, 3A, Bussman 35G		EA					
96	5920-00-122-3775 (17237Z)	Fuse, Grasshopper, 5A, Bussman 35H		EA					
97	5920-00-857-8418 (24431Z)	Fuse, Grasshopper, 7-1/2A, GTE D27087A11		EA					
98	5920-00-624-2661 (24432A)	Fuse, Grasshopper, 10A, Burndy FIL0175		EA					
99	5920-00-539-6347 (24426F)	Fuse, Indicating, Type 70, 1-1/3A		EA					
100	5920-00-284-9217 (24427G)	Fuse, Indicating, Type 70, 2A		EA					
101	5920-00-234-9218 (24428H)	Fuse, Indicating, Type 70, 3A		EA					
102	5920-00-538-6205 (23988H)	Fuse, Indicating, Type 70, 5A		EA					

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 75 3071-R

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS
For use of this form, see AN 105-22, The Procurement Agency in the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE			
TELER NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	PAGE NO.	NO. OF PAGES	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRE	
103	NSMR (24429A)	Fuse, Indicating, Type 70, 1/4A with 10 Ohm Resistor in Series, 250 V, Lorain #2486-203	EA				
104	5920-00-665-0515 (24411J)	Fuse, 3AB, Alarm, 1A, Buss	EA				
105	5920-00-195-2330 (24442Z)	Fuse, 3AB, Alarm, 1A, Littlefuse	EA				
106	5920-00-295-7013 (24443A)	Fuse, 3AB, Alarm, 2A, Buss	EA				
107	5920-01-007-5676 (24444B)	Fuse, 3AB, Alarm, 2A, Littlefuse	EA				
108	5920-00-503-4843 (24445C)	Fuse, 3AB, Alarm 3A, Buss	EA				
109	5920-00-133-4898 (24446D)	Fuse, 3AB, Alarm, 3A, Littlefuse	EA				
110	5920-00-806-3152 (24447E)	Fuse, 3AB, Alarm, 4A, Buss	EA				
111	5920-01-007-5677 (24448F)	Fuse, 3AB, Alarm, 5A, Littlefuse	EA				
112	NSMR (24449G)	Fuse, 3AB, 15A, 250 V, Littlefuse 314015	EA				
113	NSMR (24432B)	Fuse, 5AG, Normal, 1A, Littlefuse 512001	EA				

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
TELECOM NUMBER		NOMENCLATURE		PAGE NO. NO. OF PAGES	
ITEM NO.	STOCK NUMBER		UNIT	TOTAL REQ FOR PROJECT COMMAND	AVAILABLE IN PROJECT COMMAND
114	NSNR (24434C)	Fuse, 5AG, Normal, 2A, Littlefuse 512002	EA	13	20
115	NSNR (24435D)	Fuse, 5AG, Normal, 3A, Littlefuse 512003	EA		
116	5920-00-280-3469 (21724Z)	Fuse, 5AG, Normal, 5A, Littlefuse 512005	EA		
117	NSNR (24436E)	Fuse, 5AG, Normal, 8A, Littlefuse 512008	EA		
118	NSNR (24437F)	Fuse, 5AB, Normal, 10A, Littlefuse 514010	EA		
119	NSNR (24438G)	Fuse, 5AB, Normal, 15A, Littlefuse 514015	EA		
120	NSNR (24439H)	Fuse, 5AB, 510-810, 5A, Littlefuse 523005	EA		
121	NSNR (21723W)	Fuse, 5AB, 510-810, 10A, Littlefuse 523010	EA		
122	NSNR (24440K)	Fuse, 5AB, 510-810, 15A, Littlefuse 523015	EA		
123	NSNR (24047A)	Fuse, One-Time, Non-Type, Cartridge, 6A, 250V, Lorain #2483-505	EA		
124	5920-00-904-2671 (180430)	Fuse, Type 70 (Indicating/Alarm) 1-1/3A, Lorain #2486-208	EA		
125	NSNR (21698F)	Fuse, One-Time, Non-Type, Cartridge, 30A, 250V, Lorain #2483-515	EA		

EDITION OF 1 AUG 72 IS OBSOLETE

DA FORM 1 APR 73 3071-R

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

SEIP 020

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
				UNIT	
				TOTAL AVAILABLE PROJECT-FORWARD	
				PAGE NO. NO. OF PAGES	
				14 20	
126		NSNR (21697E)		Fuse, One-Time, Non-Type, 50A, 250V, Lorain #2483-523	EA
127	5920-00-067-6783 (24826Z)			Fuse, Link, 70A, 250V, Lorain #2484-625	EA
128	NSNR (22107H)			Fuse, Link, 150A, 250V, Lorain #2484-637	EA
129	NSNR (22170Y)			Fuse, Link, 200A, 250V, Lorain #2484-641	EA
130	NSNR (21729E)			Fuse Block, For 5AG Fuses, 10 Poles, Screw Terminals, Littlefuse #556010	EA
131	N. NR (21950E)			Fuse Panel Bus Bar, 2 Panels, Lorain #3476-102	EA
132	NSNR (22207W)			Ground Bar, Copper, 700A, 23" Mtg, Lorain #4361-041	EA
133	5940-00-001-3520 (21712W)			Ground Terminal Strip, Lorain #4835-530	EA
134	NSNR (21595C)			Heat Baffle, 23" x 3-1/2", Lorain #4133-024	EA
135	NSNR (24994B)			Heat-Shrink Insulator, 4/0-400 MCM, 8" Lg, T&B HS40-400, Pkg of 5	PKG
136	NSNR (23313D)			Insulating Mounting Assembly for 23" Ground Bar, 4", Lorain #4133-036	EA

EDITION OF 1 AUG 73 IS OBSOLETE.

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
137		NSNR (217268)		Jumper, Square D, Type 9080-JCA-6	
138		NSNR (23922H)		Key Switch, 3C, Lorain #2523-314	
139		5975-00-642-7263 (026220)		Locknut, Conduit, 2", T&B #146	
140		5940-00-001-3498 (217105)		Lug Adapter, Angle, Lorain #3627-531	
141		5180-00-001-3522 (21708F)		Lug Kit, #14-4 AWG, Lorain #4835-523	
142		NSNR (22210A)		Lug Kit, #8-2 AWG, Lorain #4835-524	
143		5180-00-001-3523 (21824A)		Lug Kit, #4-3/0 AWG, Lorain #4835-526	
144		5180-00-001-3518 (21711H)		Lug Kit, #1/0 AWG-350 MCM, Lorain #4835-527	
145		5940-00-636-5015 (103978)		Lug, Locktite, #4 AWG, T&B #31007	
146		5940-00-848-8847 (21720F)		Lug, Terminal, #22 AWG, T&B STA-RON, RA-1123	
147		5940-00-866-2586 (21955Z)		Lug, Terminal, #10 AWG, 1/4" Bolt, T&B #RC10-14	
TOTAL AVAILABLE IN PROJECT FORWARD		15		PAGE NO. 15 OF 20	

FORM 1 AUG 74 IS OBSOLETE.

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOM NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
				UNIT	
				TOTAL AVAILABLE PROJECT FOR PROJECT REQUIRED	
				PAGE NO. OF PAGE	
				16	
				20	
148	5940-00-557-1629 (07540B)	Lug, Terminal, #20 AWG, T&B RA863	EA		
149	NSMR (21719F)	Lug, Terminal, #8 AWG, T&B Stakon RD 367	EA		
150	NSMR (21718E)	Lug, Terminal, #18-14 AWG, T&B RB864	EA		
151	NSMR (23942F)	Mounting Channel, Square D, Type 1828-C22X38	EA		
152	5310-00-141-3034 (09727C)	Nut, Hex, Brass, 1/4-20	EA		
153	5310-00-550-2490 (07675L)	Nut, Plain, Hex, Steel, Cad Pltd, #8-32	EA		
154	5310-00-285-1650 (00559H)	Nut, Plain, Hex, Steel, Cad Pltd, 1/4-20	EA		
155	NSMR (24414E)	Panel, Ac Outlet, 23" X 3-1/2", IAW Dwg STD-MS-0017	EA		
156	NSMR (20942W)	Panel, Blank, 23" X 1-3/4", Lorain #3531-106	EA		
157	NSMR (20961F)	Panel, Blank, 23" X 3-1/2", Lorain #3532-112	EA		
158	5975-00-101-3512 (20979C)	Panel, Blank, 23" X 5-1/4", Lorain #3533-106	EA		
159	5975-00-101-3513 (20960E)	Panel, Blank, 23" X 7", Lorain #3534-103	EA		

FOR USE OF 1 AUG 72 IS 040404.

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION SEIP 020				UNIT IDENT CODE			
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				DATE			
For use of 15-11000, 100-A 100-22, the document applies to the United States Army Communications and Command				TOTAL AVAILABLE REGION IN PROJECT COMMAND			
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	PAGE NO.	NO. OF PAGES	REQUIRE	
160	NSNR (209785)	Panel, Blank, 23" X 8-3/4", Lorain #3535-102	EA	17	20		
161	5975-00-101-3530 (218270)	Panel, Termination, 23" X 3-1/2", Lorain #4341-514	EA				
162	NSNR (21846A)	Protective Screening for Dc Control Rack 23" Wide X 36" High, Lorain #4141-406	EA				
163	5305-00-206-3713 (09098X)	Screw, Mach, Pan Hd, Steel, Cad Pltd, 8-32 X 1" Lg	EA				
164	5305-00-059-7815 (24423C)	Screw, Mach, Steel, Cad Pltd, 10-32 X 1" Lg, Pan Head, Phillips	EA				
165	5305-00-639-7970 (13953E)	Screw, Mach, 12-24 X 3/4", Pan Hd	EA				
166	5305-00-935-7581 (19640Y)	Screw, Cap, Brass, 1/4-20 X 5/8" Lg	EA				
167	5305-00-989-1727 (10130J)	Screw, Mach, Steel, Cad Pltd, 1/4-20 X 1" Lg	EA				
168	5305-00-022-7798 (00230J)	Screw, Cap, 3/8-16 X 1-1/2", Hex Hd, Steel	EA				
169	5970-00-295-8161 (23204E)	Tape, Insulating, Elec, White, 3/4" Wide X 216', 1500 V	RL				
170	5970-00-816-6056 (13561K)	Tape, Insulating, Elec, Black 3/4" Wide X 108 In	RL				

EDITION OF 1 AUG 72 IS OBSOLETE.

12 AUG 72 0400LT

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODES	
TELEPHONE NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOVENCULATURE	
				UNIT	
171	5820-00-001-3310 (21956A)	Terminal Block, Square D, Type 9080-CA-10		EA	
172	NSNR (231992)	Terminal Strip, Barrier, Twin-Screw, 22 Positions, Curtis #1522 ST		EA	
173	NSNR (24830C)	Transient Peak Limiter Panel, 23" X 7" >60V, 130A (One Carl E. Holmes Co SS20HX3ECI Limiter With 40A CB) IAW Dwg STD-MS-0023		EA	
174	5310-00-167-0833 (00487C)	Washer, Flat, Steel, Cad Pltd, #8		EA	
175	5310-00-167-0834 (00488D)	Washer, Flat, Steel, #10		EA	
176	5310-00-141-1795 (14518W)	Washer, Flat, Steel, Cad Pltd, 1/4"		EA	
177	5310-00-754-4337 (06124L)	Washer, Flat, Brass, 1/4"		EA	
178	5310-00-087-7493 (08658A)	Washer, Flat, Steel, 3/8"		EA	
179	5310-00-942-5109 (19635Z)	Washer, Lock, External Tooth, Bronze, 1/4"		EA	
180	5310-00-045-3299 (09019J)	Washer, Lock, Split, Steel, Cad Pltd, #8		EA	
181	5310-00-045-3296 (00483J)	Washer, Lock, Split, Steel, #10		EA	

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 1 1/2 76 0-771-1

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOM NUMBER		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NONINCULATURE	
				UNIT	
				TOTAL AVAILABLE PROJECT	
				PAGE NO. 19	
				TOTAL AVAILABLE PROJECT	
				PAGE NO. 20	
				TOTAL AVAILABLE PROJECT	
182		5310-00-808-5381 (10231A)		EA	
183		5310-00-637-3541 (00586C)		EA	
184		NSNR (16954C)		FT	
185		6145-00-681-8374 (09217J)		FT	
186		6145-00-524-9130 (23193Y)		FT	
187		6145-00-089-6811 (11672A)		FT	
188		6145-00-050-7405 (03540K)		FT	
189		6145-00-050-7407 (03509A)		FT	
190		NSNR (09004N)		FT	
191		6145-00-990-3000 (03507W)		FT	
192		6145-00-990-2999 (03538G)		FT	

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 73 3071-1

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 100-A CEMF CELL BATTERY FACILITY		DATE	
Per use of this form, see AR 103-27, and paragraph 2, AR 103-27, and paragraph 2, AR 103-27, and paragraph 2, AR 103-27.		PAGE NO. 3 OF 20		PAGES 20	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL QTY. REQUIRED FOR PROJECT	QTY. REQUIRED
193	6145-00-479-0042 (06535A)	Wire, Single Cond, #8 AWG, Wht, Sol, Ins, 600V	FT		
194	6145-00-470-8255 (03570N)	Wire, Single Cond, #8 AWG, Blk, Sol, Ins, 600V	FT		
195	6145-00-943-0728 (03501C)	Wire, Elec, Tw, Str, #6 AWG, Wht, Ins, 600V	FT		
196	6145-00-923-2220 (03518W)	Wire, Elec, Tw, Str, #6 AWG, Blk, Ins, 600V	FT		
197	MSNR (23985E)	Wire, Elec, Tw, Str, #6 AWG, Yel, Ins, 600V, Anistat #68-0601	FT		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 100-10 6-71-R

Figure 5-2. Bill of Materials for 48-V Dc, 100-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see AR 105-22, the appropriate agency is the United States Army Communications Command.				DATE	PAGE NO. NO. OF PAGES
48-V DC, 200-A CEMF CELL BATTERY FACILITY					1 23
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE PROJECT COMMAND	REQUIRES
1	MSNR (24894A)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 840 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-840	EA		
2	MSNR (24895B)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 750 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCK-750	EA		
3	MSNR (24896C)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 860 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide 26C-9	EA		
4	MSNR (24897D)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,344 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-1344	EA		

FORM 6071-1
1 APR 78

EDITION OF 1 AUG 72 IS OBSOLETE

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility.

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 103-2, the predecessor agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELE NUMBER				DATE					
48-V DC, 200-A CEMF CELL BATTERY FACILITY				PAGE NO. 2 OF 23 PAGES					
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE PROJECT FOR CONWARD	REQUIRE				
5	NSNR (24898E)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,344 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-1344	EA						
6	NSNR (24899F)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,260 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide 26C-15	EA						
7	NSNR (24900G)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 2,016 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-2016	EA						
8	NSNR (24901H)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 2,016 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-2016	EA						

EDITION OF 1 AUG 72 IS OBSOLETE.

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS
 Per use of this form, the AR 105-17, the appropriate agency is the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE	
TELETYPE NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	PAGE NO. 3 OF 23
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL INVENTORY REQUIRED	PROCESSED
9	NSNR (24902W)	Battery Bank, Lead/Calcium-Acid, 24-Cell, 1,800 Ah, W/ 23-InterCell Connector Kit for 1/2" Spacing, 1 Kit InterCell/Step Connectors, Four 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Humeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide 26C-23	EA		
10	NSNR (18132P)	Battery Rack, 2-Tier, C & D RD-901-9	EA		
11	NSNR (24904A)	Battery Rack, 2-Tier, C & D RD-901-10	EA		
12	NSNR (24905B)	Battery Rack, 2-Tier, C & D RD-901-14	EA		
13	NSNR (24844F)	Battery Rack, 2-Tier, Gould S07-074478	EA		
14	NSNR (24907D)	Battery Rack, 2-Tier, Gould S07-074482	EA		
15	NSNR (24908E)	Battery Rack, 2-Tier, Gould S07-074493	EA		
16	NSNR (24847W)	Battery Rack, 2-Tier, Exide 84539-84	EA		
17	NSNR (24910F)	Battery Rack, 2-Tier, Exide 84537-60	EA		
18	NSNR (24460Y)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-9-EPI	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TENDER NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	PAGE NO. 4 OF 23
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL QUANTITY REQUIRED	PROJECT NUMBER
19	NSNR (24431N)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-9-EPII	EA		
20	NSNR (24913W)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-10-EPI	EA		
21	NSNR (24914Z)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-10-EPII	EA		
22	NSNR (24915A)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-14-EPI	EA		
23	NSNR (24916B)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-14-EPII	EA		
24	NSNR (24854E)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Gould S07-074478-333	EA		
25	NSNR (24918D)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074478-666	EA		
26	NSNR (24919E)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Gould S07-074482-333	EA		
27	NSNR (24920E)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074482-666	EA		
28	NSNR (24921F)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Gould S07-074493-333	EA		
29	NSNR (24922G)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074493-666	EA		
30	NSNR (24471M)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84533-84	EA		

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd.).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELEPHONE NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	NOV ENCLATURE	UNIT	TOTAL NOV. ASSESSMENT REQUIRED	PAGE NO. 5
31	MSNR (24361A)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restrains, Exide 84786-84	EA		
32	MSNR (24862B)	Battery Rack, 2-Tier, Seismic Zone 4 Restrains, Exide 84753-84	EA		
33	MSNR (24925A)	Battery Rack, 2-Tier, Seismic Zone 1 Restrains, Exide 84537-60	EA		
34	MSNR (24927B)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restrains, Exide 84798-108	EA		
35	MSNR (24928C)	Battery Rack, 2-Tier, Seismic Zone 4 Restrains, Exide 84755-108	EA		
36	MSNR (24866F)	Battery Rack, 2-Step, C & D RD-903-9	EA		
37	MSNR (24930D)	Battery Rack, 2-Step, C & D RD-903-10	EA		
38	MSNR (24931E)	Battery Rack, 2-Step, C & D RD-903-14	EA		
39	MSNR (24668H)	Battery Rack, 2-Step, Gould S07-074516	EA		
40	MSNR (24933S)	Battery Rack, 2-Step, Gould S07-074520	EA		
41	MSNR (24934H)	Battery Rack, 2-Step, Gould S07-074531	EA		

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd.).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS			
For use of this form, see AR 103-22. The incumbent agency is the United States Army Communications Command.			
SECTION 04		UNIT IDENT CODE	
SEIP 020		PAGE NO. 23	
TELEPHONE NUMBER	48-V DC, 200-A CEMF CELL BATTERY FACILITY	DATE	6
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT
42	NSNR (24871Z)	Battery Rack, 2-Step, Exide 84556-84	EA
43	NSNR (24936Z)	Battery Rack, 2-Step, Exide 84558-108	EA
44	NSNR (24455K)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-9-EPI	EA
45	NSNR (24496U)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-9-EPII	EA
46	NSNR (24939C)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-10-EPI	EA
47	NSNR (24940C)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-10-EPII	EA
48	NSNR (24941D)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-14-EPI	EA
49	NSNR (24942E)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-14-EPII	EA
50	NSNR (24880K)	Battery Rack, 2-Step, Seismic Zone Restraints, Gould S07-074516-333	EA
51	NSNR (24881J)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074516-656	EA
52	NSNR (24945H)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Gould S07-074520-333	EA
53	NSNR (24946W)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074520-666	EA

SECTION OF MATERIALS DISPOSITION

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT C/D/E	
TELER NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOV ENCLATURE	
				UNIT	
				TOTAL NO. OF REQS FOR IN- PROJECT COMMOD	
54	NSNR (24947Z)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Gould S07-074531-333		EA	
55	NSNR (24348A)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restrains, Gould S07-074531-666		EA	
56	NSNR (24386D)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Exide 84556-84		EA	
57	NSNR (24887E)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restrains, Exide 84020-84		EA	
58	NSNR (24888F)	Battery Rack, 2-Step, Seismic Zone 4 Restrains, Exide 83987-84		EA	
59	NSNR (24952D)	Battery Rack, 2-Step, Seismic Zone 1 Restrains, Exide 84558-108		EA	
60	NSNR (24953E)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restrains, Exide 84022-108		EA	
61	NSNR (24954F)	Battery Rack, 2-Step, Seismic Zone 4 Restrains, Exide 83989-108		EA	
62	NSNR (21661B)	Cabinet, Equipment, 19" Wide, 31" Deep, 84" Panel Mounting Space, Electric Blue, Modification Rear Door (Mod LS), Par- Metal #PC-8413		EA	
63	NSNR (21786F)	Cabinet Base, Recessed For 19" W X 31" Deep Cabinet, Par- Metal #CD-1931, Electric Blue		EA	
64	NSNR (24889G)	CEMF Cell Panel, 3V, 200A, 23" X 8-3/4", Lorain #4628-303		EA	

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see DA Form 102-2, the Department of the Army Standard Army Communications Command.				DATE	PAGE NO. OF PAGES
LOCATION	SEIP 020	48-V DC, 200-A CEMF CELL BATTERY FACILITY	NON-ENCLOSURE	UNIT	TOTAL AVAILABLE FOR PROJECT SUBVANS
ITEM NO.	STOCK NUMBER				
65	NSNR (24393Z)	Circuit Breaker Enclosure, 20" X 30" X 6-5/8", Equipped With 2-100A Main, 2-15A, 2-10A, and 26-5A DC Breakers, 200A Rtn Bus Bar, and Termination For 300 MCM Cable, Curtis Industries 271C7.			
66	NSNR (18156N)	Disconnect Panel, Low-Voltage, 23" X 3-1/2", 200A, Lorain #4863-708			
67	NSNR (22112B)	Electrolyte, 5-Gal Container, 1.400 Specific Gravity			
68	NSNR (22111A)	Electrolyte, 15-Gal Container, 1.400 Specific Gravity			
69	NSNR (24411B)	Filter, Decentralizing, 48-V DC, 100A, 23" X 10-1/2" Rack Mounting, Lorain #4826-084			
70	NSNR (24415F)	Filter, Decentralizing, 48-V DC, 50A, 23" X 7" Rack Mounting, Lorain #4826-065			
71	5920-00-156-3681 (24401C)	Fuse Panel, 48-V DC, 23" X 10-1/2", Four 61-400A Fuse Positions, Lorain #4317-012			
72	5920-00-278-4805 (15038K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Two 61-400A Fuse Positions, Lorain #4316-002			
73	NSNR (21942H)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 31-60A Fuse Positions, Lorain #4317-009			
74	NSNR (24129F)	Fuse Panel, 48-V DC, 23" X 5-1/4", Four 0-30A & Four 31-60A Fuse Positions, Lorain #4317-010			
75	5920-00-278-4817 (18159K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 0-30A Fuse Positions, Lorain #4317-008			

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 102-2 1 APR 76 5011-1

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd)

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		UNIT	
		DESCRIPTION		TOTAL AVAILABLE PROJECT REQUIRED	
76	MSNR (21867Z)	Fuse Panel, 48-V DC, 23" X 1-3/4", Twenty-two 0-5A Fuse Positions, Lorain #4318-405	EA	9	23
77	MSNR (24418W)	Fuse Panel, 48-V DC, 19" X 1-3/4", (18) 0-5A Type 70 Fuses, Lorain #4317-408 Unmodified	EA		
78	MSNR (22114D)	Fuse Panel, 48-V DC, 19" X 5-1/4", Three 0-30A And Three 31-60A Fuse Positions, Lorain #4316-506	EA		
79	MSNR (18825D)	Fuse Panel, 48-V DC, 19" X 5-1/4", Six 0-30A Fuse Positions, Lorain #4316-505	EA		
80	MSNR (21691J)	Fuse Panel, 48-V DC, 19" X 5-1/4", Six 31-60A Fuse Positions, Lorain #4316-507	EA		
81	5920-00-177-2738 (21689H)	Fuse Panel, 48-V DC, 19" X 5-1/4", One 61-400A Fuse Position, Lorain #4314-012	EA		
82	MSNR (18332N)	Inverter, 5-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AAQ502B	EA		
83	MSNR (24409A)	Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA202B	EA		
84	MSNR (24410A)	Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 50/60 Hz, Lorain #XMBG202B1	EA		
85	MSNR (24408Z)	Inverter, 1-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA102B	EA		
86	MSNR (21851E)	Inverter, 500-VA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA501B	EA		
87	MSNR (22410C)	Kit, Emergency Battery Safety	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
Per use of this form, see AR 105-22, the procuring agency is the United States Army Communications Command.		PAGE NO. 10		PAGE 23	
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL AVAILABLE FOR PROJECT	REQUIRE
88	NSNR (24890L)	Meter Panel Assembly, Consisting of: Meter Panel, 23" X 8-3/4", 48-V DC, Rack Mounting; Equipped With a 0- to 75-Volt DC Voltmeter (1% Accuracy) Lorain #4374-061	EA		
	NSNR (24891K)	Ammeter, 0- to 200-Amp, Lorain #2925-775	EA		
	NSNR (23201B)	Ammeter Shunt, 200-Amp, Lorain #2982-714	EA		
89	5805-00-177-2919 (22113C)	Meter Panel Assembly, Consisting of: Meter Panel, 19" X 5-1/4", 48-V DC, Rack Mounting; Equipped With a 0- to 75-Volt DC Voltmeter (1% Accuracy) Lorain #4374-018	EA		
	NSNR (24891K)	Ammeter, 0- to 200-Amp, Lorain #2925-775	EA		
	NSNR (23201B)	Ammeter Shunt, 200-Amp, Lorain #2982-714	EA		
90	5975-00-J01-3525 (222020)	Rack, Relay, 23" X 7", With 4 Cable Brackets Per Rack, Lorain #4124-010	EA		
91	NSNR (24366A)	Rectifier-Charger, 48-V DC, 200A; 3 Ø, 208 V AC, 60 Hz; Lorain #RHM200D50	EA		
92	6130-00-J01-3508 (22232A)	Rectifier-Charger, 48-V DC, 200A; 3 Ø, 380 V AC, 50/60 Hz; Lorain #RHM200C50	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 124176 6071-1

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELEPHONE		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOV ENCLATURE	
93		MSNR (22371L) 6625-01-031-2098 (24995C)		Shunt and Contactor Panel Assembly Consisting of: Shunt and Contactor Panel, 200A, 23" X 3-1/2", Lorain #4376-017 Meter Shunt, 200A, Lorain #2982-716	
94		MSNR (24996D)		Switch, Safety, Unfused Knife Blade, 3-Pole, 240 V AC, 100 A, NEMA 1 Indoor Enclosure, Wall Mounting, Square D Type Q02000NAS	
95		MSNR (218256)		Bus Bar, Term Panel to Charge/Discharge Fuse Panel, Lorain #3425-194	
96		5975-00-710-0876 (21705C)		Bushing, 2" OD, Chase Nipple, T&B #1947	
97		6145-00-845-5206 (15104A)		Cable, 1-Pr, #20 AWG, Str, Ins	
98		MSNR (21717D)		Cable, 3-Pr, #22, Str, Belden #9745	
99		6145-00-081-1049 (20992E)		Cable, Indiv Shld Cond, 11-Pr, #22 AWG, Sol, W/Gnd Wire, Belden #8765	
100		6145-00-051-9790 (035166)		Cable, Single Cond, #2 AWG, Blk, Str	
101		6145-00-184-3875 (03499A)		Cable, Single Cond, #2 AWG, Wht, Str	
TOTAL		TOTAL		TOTAL	
NO.		NO.		NO.	
11		11		11	
PAGES		PAGES		PAGES	
23		23		23	

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 76 2011-11

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd)

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
SEIP 020				UNIT IDENT CODE	
48-V DC, 200-A CEMF CELL BATTERY FACILITY				UNIT IDENT CODE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	DATE	PAGE NO. OF 12 PAGES
102	NSNR (21830F)	Cable, Single Cond, Str, Ins, 600V, 350 MCM, Wht, Anixter #68-3501	FT		23
103	6145-00-417-5797 (037550)	Cable, Single Cond, Str, Ins, 600V, 350 MCM, Blk	FT		
104	6145-00-689-9338 (14823F)	Cable, 2-Cond, Str, Ins, #16 AWG, Belden 8471	FT		
105	6145-00-584-7974 (11474A)	Cable, 3-Cond, Str, Ins, #16 AWG, Belden 9219	FT		
106	NSNR (244055)	Capacitor Filter Panel, 19" X 7", For 48 V DC, IAW Dwg STD-MS-0003	EA		
107	NSNR (24404F)	Capacitor Filter Panel, 23" X 7", For 48V DC, IAW Dwg STD-MS-0003	EA		
108	NSNR (21819C)	Compound, Sealing, Nonhardening Permagum	BG		
109	5940-00-961-0477 (24412C)	Connector, Two-Way, #4/0 AWG-300 MCM, T88 #32513	EA		
110	NSNR (21725A)	Copper Strip, 1/2" Wide, 5" Long, 1/32" Thick	EA		
111	5340-00-754-4560 (00740C)	Expansion, Shield, 3/8" -16, Mach Bolt	EA		
112	5920-00-901-9936 (103330)	Fuse, GMT 1, 1A	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 100-22, the dependent agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE		DATE		PAGE NO. OF	
TELLER NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		NOMENCLATURE		UNIT		TOTAL AVAILABLE	
ITEM NO.	STOCK NUMBER							REQ FOR PROJECT FORWARD	
113	5920-00-857-8933 (244240)	Fuse, GMT 2, 2A				EA			
114	5920-00-081-5958 (16532X)	Fuse, GMT 3, 3A				EA			
115	5920-01-056-7256 (24425E)	Fuse, GMT 3-1/2, 3-1/2A				EA			
116	5920-00-857-8417 (17144N)	Fuse, GMT 5, 5A				EA			
117	NSMR (24831D)	Fuse, GMT 10, 10A, Lorain #2486-112				EA			
118	5920-00-156-0838 (14624E)	Fuse, Grasshopper, 1-1/3A, Bussman 35B				EA			
119	5920-00-556-9728 (24430J)	Fuse, Grasshopper, 2A, Bussman 35L				EA			
120	5920-00-156-0837 (16432K)	Fuse, Grasshopper, 3A, Bussman 35G				EA			
121	5920-00-122-3775 (17237Z)	Fuse, Grasshopper, 5A, Bussman 35H				EA			
122	5920-00-857-8418 (24431Z)	Fuse, Grasshopper, 7-1/2A, GTE D27087A11				EA			
123	5920-00-624-2661 (24432A)	Fuse, Grasshopper, 10A, Burndy FIL01T5				EA			
124	5920-00-539-6347 (24426F)	Fuse, Indicating, Type 70, 1-1/3A				EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		Per use of this form, the project agency is the United States Army Communications Command.		DATE	
TILER NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		PAGE NO. 14 OF 23	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE FOR PROJECT COMMAND	REQUIRE
125	5920-00-284-9217 (24427G)	Fuse, Indicating, Type 70, 2A	EA		
126	5920-00-284-9218 (24428H)	Fuse, Indicating, Type 70, 3A	EA		
127	5920-00-538-6205 (23988H)	Fuse, Indicating, Type 70, 5A	EA		
128	NSNR (24429W)	Fuse, Indicating, Type 70, 1/4A with 10 Ohm Resistor in Series, 250 V, Lorain #2486-203	EA		
129	5920-00-665-0515 (24441J)	Fuse, 3AB, Alarm, 1A, Buss	EA		
130	5920-00-195-2330 (24442Z)	Fuse, 3AB, Alarm, 1A, Littlefuse	EA		
131	5920-00-295-7013 (24443A)	Fuse, 3AB, Alarm, 2A, Buss	EA		
132	5920-01-007-5676 (24444B)	Fuse, 3AB, Alarm, 2A, Littlefuse	EA		
133	5920-00-503-4843 (24445C)	Fuse, 3AB, Alarm 3A, Buss	EA		
134	5920-00-133-4898 (24446D)	Fuse, 3AB, Alarm, 3A, Littlefuse	EA		
135	5920-00-806-3152 (24447E)	Fuse, 3AB, Alarm, 4A, Buss	EA		
136	5920-01-007-5677 (24443F)	Fuse, 3AB, Alarm, 5A, Littlefuse	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 1 APR 78 6011-1

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		UNIT	
NOMENCLATURE		TOTAL AVAILABLE IN PROJECT COMMAND		PAGE NO. OF PAGES	
				15 23	
137	NSNR (24449G)	Fuse, 3AB, 15A, 250 V, Littlefuse 314015	EA		
138	NSNR (24433B)	Fuse, 5AG, Normal, 1A, Littlefuse 512001	EA		
139	NSNR (24434C)	Fuse, 5AG, Normal, 2A, Littlefuse 512002	EA		
140	NSNR (24435D)	Fuse, 5AG, Normal, 3A, Littlefuse 512003	EA		
141	5920-00-280-3469 (21724Z)	Fuse, 5AG, Normal, 5A, Littlefuse 512005	EA		
142	NSNR (24436E)	Fuse, 5AG, Normal, 8A, Littlefuse 512008	EA		
143	NSNR (24437F)	Fuse, 5AB, Normal, 10A, Littlefuse 514010	EA		
144	NSNR (24438G)	Fuse, 5AB, Normal, 15A, Littlefuse 514015	EA		
145	NSNR (24439H)	Fuse, 5AB, 510-810, 5A, Littlefuse 523005	EA		
146	NSNR (21723W)	Fuse, 5AB, 510-810, 10A, Littlefuse 523010	EA		
147	NSNR (24440K)	Fuse, 5AB, 510-810, 15A, Littlefuse 523015	EA		
148	NSNR (24047A)	Fuse, One-Time, Non-Type, Cartridge, 6A, 250V, LoraIn #2483-505	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 3071-10
1 APR 70

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM N.O.		STOCK NUMBER		NOMENCLATURE	
				UNIT	
				TOTAL AVAILABLE PROJECT COMMAND	
				PAGES 16	
				23	
149	5920-00-904-2671 (180430)	Fuse, Type 70 (Indicating/Alarm) 1-1/3A, Lorain #2486-208		EA	
150	NSNR (21698F)	Fuse, One-Time, Non-Type, Cartridge, 30A, 250V, Lorain #2483-515		EA	
151	NSNR (21697E)	Fuse, One-Time, Non-Type, 50A, 250V, Lorain #2483-523		EA	
152	NSNR (21838D)	Fuse, Link, 125A, 250V, Lorain #2484-635		EA	
153	NSNR (21839E)	Fuse, Link, 250A, 250V, Lorain #2484-645		EA	
154	5920-00-J01-3496 (21840E)	Fuse, Link, 400A, 250V, Lorain #2484-651		EA	
155	NSNR (21729E)	Fuse Block, For SAG Fuses, 10 Poles, Screw Terminals, Littlefuse #556010		EA	
156	NSNR (21950E)	Fuse Panel Bus Bar, 2 Panels, Lorain #3476-102		EA	
157	NSNR (22207W)	Ground Bar, Copper, 700A, 23" Mtg, Lorain #4361-041		EA	
158	NSNR (24892J)	Ground Bar, Copper, 400A, 19" Mtg, Lorain #4361-038		EA	
159	NSNR (23220J)	Ground Bar, Copper, 0-700A, 19" Mtg, Lorain #4361-039		EA	
160	5940-00-J01-3520 (21712W)	Ground Terminal Strip, Lorain #4835-530		EA	

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see AR 103-22, the Procurement Agency in the United States Army Communications Command.				DATE	PAGE NO. 17 OF 23
LOCATION SEIP 020				UNIT	TOTAL AVAILABLE FOR PROJECT FORWARD
TELEPHONE NUMBER 48-V DC, 200-A CEMF CELL BATTERY FACILITY				EA	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL AVAILABLE FOR PROJECT FORWARD
161	NSNR (21695C)	Heat Baffle, 23" x 3-1/2", Lorain #4133-024		EA	
162	NSNR (23946Z)	Heat-Shrink Insulator, 500-1,000 MCH, 9" Lg, T&B HS500-1,000 Pkg of 5		PKG	
163	NSNR (23313D)	Insulating Mounting Assembly for 23" Ground Bar, 4", Lorain #4133-036		EA	
164	NSNR (21726B)	Jumper, Square D, Type 9080-JCA-6		EA	
165	NSNR (23922H)	Key Switch, 3C, Lorain #2523-314		EA	
166	5975-00-642-7263 (02622D)	Locknut, Conduit, 2", T&B #146		EA	
167	5940-00-J01-3498 (21710G)	Lug Adapter, Angle, Lorain #3627-531		EA	
168	5180-00-J01-3522 (21708F)	Lug Kit, #14-4 AWG, Lorain #4835-523		EA	
169	NSNR (22210A)	Lug Kit, #8-2 AWG, Lorain #4835-524		EA	
170	5180-00-J01-3523 (21824A)	Lug Kit, #4-3/0 AWG, Lorain #4835-526		EA	
171	5180-00-J01-3518 (21711H)	Lug Kit, #1/0 AWG-350 MCM, Lorain #4835-527		EA	
172	5940-00-636-5015 (10397B)	Lug, Locktite, #4 AWG, T&B #31007		EA	

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 100-22, the appropriate agency in the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELEPHONE NUMBER		48-V DC, 200-A CEMF CELL BATTERY FACILITY							
ITEM NO.		STOCK NUMBER		NOMENCLATURE		UNIT		TOTAL AVAILABLE REQ FOR IN PROJECT EQUIP COMMAND	
173	5940-00-048-8847 (21720F)	Lug, Terminal, #22 AWG, T&B STA-KON, RA-1123		EA					
174	5940-00-866-2586 (21955Z)	Lug, Terminal, #10 AWG, 1/4" Bolt, T&B #RC10-14		EA					
175	5940-00-557-1629 (07504B)	Lug, Terminal, #20 AWG, T&B RA863		EA					
176	NSNR (21719F)	Lug, Terminal, #8 AWG, T&B Stakon RD 367		EA					
177	NSNR (21718E)	Lug, Terminal, #18-14 AWG, T&B RB864		EA					
178	NSNR (23942F)	Mounting Channel, Square D, Type 1828-C22X38		EA					
179	5310-00-616-6948 (10674D)	Nut, Hex, Brass, #10-24		EA					
180	5310-00-141-3034 (09727C)	Nut, Hex, Brass, 1/4-20		EA					
181	5310-00-550-2490 (07675L)	Nut, Plain, Hex, Steel, Cad Pltd, #8-32		EA					
182	5310-00-285-1650 (00558H)	Nut, Plain, Hex, Steel, Cad Pltd, 1/4-20		EA					
183	NSNR (24997E)	Panel, Ac Outlet, 19" X 3-1/2", IAM Dwg STD-MS-0017		EA					
184	5975-00-937-4583 (00879Z)	Panel, Blank, 19" X 1-3/4" X 1/8", Grey		EA					

FORM 10-74

EDITION OF 1 AUG 72 IS OBSOLETE.

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
SEIP 020				DATE	PAGE NO. 19 OF 23
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				DATE	PAGE NO. 19 OF 23
48-V DC, 200-A CEMF CELL BATTERY FACILITY				DATE	PAGE NO. 19 OF 23
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE PROJECT STOCK	REQUIREMENT
185	5975-00-686-2541 (08712Z)	Panel, Blank, 19" X 3-1/2" X 1/8", Grey	EA		
186	5975-00-975-4448 (15288K)	Panel, Blank, 19" X 5-1/4" X 1/8", Grey	EA		
187	5975-00-051-7337 (03034K)	Panel, Blank, 19" X 7" X 1/8", Grey	EA		
188	NSNR (20942W)	Panel, Blank, 23" X 1-3/4", Lorain #3531-106	EA		
189	NSNR (20961F)	Panel, Blank, 23" X 3-1/2", Lorain #3532-112	EA		
190	5975-00-J01-3512 (20979C)	Panel, Blank, 23" X 5-1/4", Lorain #3533-106	EA		
191	5975-00-J01-3513 (20960E)	Panel, Blank, 23" X 7", Lorain #3534-103	EA		
192	NSNR (209788)	Panel, Blank, 23" X 8-3/4", Lorain #3535-102	EA		
193	NSNR (23933H)	Panel, Blank, 23" X 10-1/2", Lorain #3536-101	EA		
194	5975-00-J01-3530 (21827D)	Panel, Termination, 23" X 3-1/2", Lorain #4341-514	EA		
195	NSNR (21846A)	Protective Screening for Dc Control Rack 23" Wide X 36" High, Lorain #4141-406	EA		
196	5305-00-206-3713 (09098X)	Screw, Mach, Pan Hd, Steel, Cad Pltd, 8-32 X 1" Lg	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

SEIP 020

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
Per use of this form, see AR 123-22, the responsible agency is the United States Army Communications Command.		STOCK NUMBER		PAGE NO. 20 OF 23	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE FOR PROJECT COMMAND	TOTAL REQUIRED FOR PROJECT COMMAND
197	5305-00-059-7815 (24423C)	Screw, Mach, Steel, Cad Pltd, 10-32 X 1" Lg, Pan Head, Phillips	EA		
198	5305-00-001-3733 (19746A)	Screw, Mach, 10-32 X 3/4" Lg, Par-Metal GSC10-3, Lt Grey, w/Molded Nylon Washer	EA		
199	5305-00-639-7970 (13953E)	Screw, Mach, 12-24 X 3/4", Pan Hd	EA		
200	5305-00-935-7581 (19640Y)	Screw, Cap, Brass, 1/4-20 X 5/8" Lg	EA		
201	5305-00-988-1747 (10130J)	Screw, Mach, Steel, Cad Pltd, 1/4-20 X 1" Lg	EA		
202	5305-00-022-7798 (00230J)	Screw, Cap, 3/8-16 X 1-1/2", Hex Hd, Steel	EA		
203	NSNR (21662C)	Side Panel, For 31" Deep Cabinet, Blue, Par-Metal MCS-843	EA		
204	NSNR (23202C)	Switch, Miniature, Toggle, Dpdt, Radio Shack Cat. No. 275-1546	EA		
205	5970-00-295-8161 (23204E)	Tape, Insulating, Elec, White, 3/4" Wide X 216', 1500 V	RL		
206	5970-00-816-6056 (13561K)	Tape, Insulating, Elec, Black 3/4" Wide X 108 In	RL		
207	5820-00-001-3310 (21956A)	Terminal Block, Square D, Type 9080-CA-10	EA		
208	NSNR (23199Z)	Terminal Strip, Barrier, Twin-Screw, 22 Positions, Curtis #1522 ST	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

AD-A072 142

ARMY COMMUNICATIONS COMMAND FORT HUACHUCA AZ
STANDARD ENGINEERING INSTALLATION PACKAGE. UNINTERRUPTIBLE POWE--ETC(U)
JUL 79

F/G 9/3

UNCLASSIFIED

ACC-SEIP-020

NL

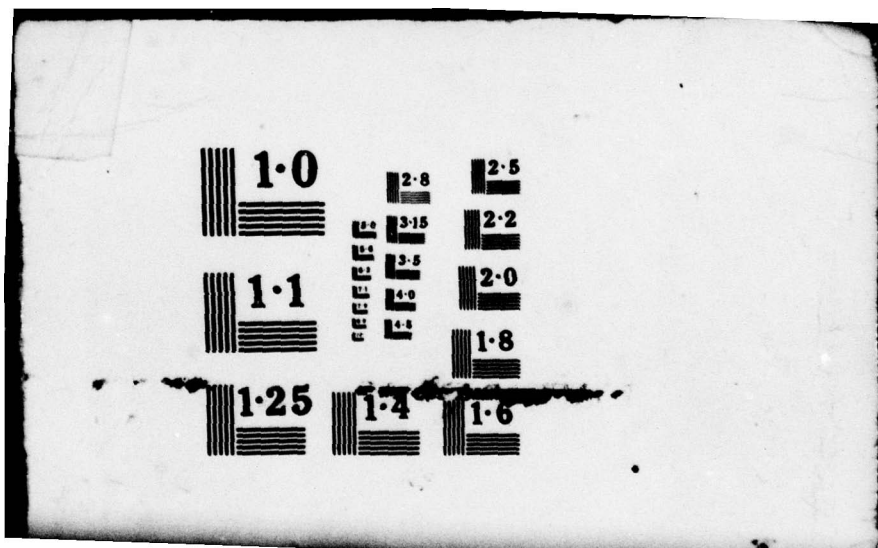
4 OF 4
AD
A072142

END

END
DATE
FILMED

9 - 79

DDC



TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS

For use of this form, see AIR 100-22, the master plan, in the United States Army Communications Command.

UNIT IDENT CODE		PAGE NO. OF 21		DATE		TOTAL ANALYSIS REQUIRED FOR PROJECT FORWARDED	
ITEM NO.	STOCK NUMBER	NO./NOMENCLATURE	UNIT	EA	EA	EA	EA
209	MSR (217043)	Transient Peak Limiter, 19" X 7", >60V, 260A (One Carl E. Holmes Co SS20HX3EC2 Limiter With 60A CB) IAW Dwg STD-MS-0023	EA				
210	MSR (24398F)	Transient Peak Limiter Panel, 23" X 7" >60V, 260A (One Carl E. Holmes Co SS20HX3EC2 Limiter With 60A CB) IAW Dwg STD-MS-0023	EA				
211	MSR (233132)	Vertical Side Support Set, 87" Lg. Par-Metal #CVS-84, (Set of 4 with Mtg Bolts)	SET				
212	5310-00-167-0833 (0487C)	Washer, Flat, Steel, Cad Pltd, #8	EA				
213	5310-00-167-0834 (004880)	Washer, Flat, Steel, #10	EA				
214	5310-00-141-1795 (14515A)	Washer, Flat, Steel, Cad Pltd, 1/4"	EA				
215	5310-00-754-4337 (06124L)	Washer, Flat, Brass, 1/4"	EA				
216	5310-00-037-7493 (06655A)	Washer, Flat, Steel, 3/8"	EA				
217	5310-00-942-5109 (15032Z)	Washer, Lock, External Tooth, Bronze, 1/4"	EA				
218	5310-00-245-3239 (00019U)	Washer, Lock, Split, Steel, Cad Pltd, #8	EA				
219	5310-00-045-3296 (00493U)	Washer, Lock, Split, Steel, #10	EA				

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 2077-1
1 APR 68

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE		
For use of this form, see AN 103-22, the Standard Agency N the United States Army Communications Command.				DATE	PAGE NO. 22	PAGE 23
LOCATION	SEIP 020	48-V DC, 200-A CEMF CELL BATTERY FACILITY		UNIT	TOTAL AVAILABLE FOR USE	REQUIRED
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL AVAILABLE FOR USE	REQUIRED
220	5310-00-808-5381 (10231A)	Washer, Lock, Split, Steel, Cad Pltd, 1/4"		EA		
221	5310-00-637-9541 (00586C)	Washer, Lock, Split, Steel, 3/8"		EA		
222	NSNR (16954C)	Wire, Elec, Tw, #20 AWG, Blu, Str, Ins, 600V, Beiden #8919-13		FT		
223	6145-00-681-8374 (09217J)	Wire, Elec, Tw, #18 AWG, Wht, Str, Ins		FT		
224	6145-00-524-9130 (23193Y)	Wire, Elec, Tw, #18 AWG, Blk, Str, Ins		FT		
225	6145-00-089-6811 (11672A)	Wire, Elec, Tw, #18 AWG, Red, Sol, Ins, 600V		FT		
226	6145-00-050-7405 (03540K)	Wire, #14 AWG, Blk, Sol, 600V, Ins		FT		
227	6145-00-050-7407 (03509A)	Wire, #14 AWG, Wht, Sol, 600V, Ins		FT		
228	NSNR (09004N)	Wire, Elec, Tw, #12 AWG, Yel, Sol, Ins, 600V		FT		
229	6145-00-990-3000 (03507M)	Wire, Single Cond, #10 AWG, Wht, Sol, Ins, 600V		FT		
230	6145-00-990-2999 (03538G)	Wire, Single Cond, #10 AWG, Blk, Sol, Ins, 600V		FT		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 103-22-1

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 200-A CEMF CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
231	6145-00-479-0042 (06535A)	Wire, Single Cond, #8 AWG, Wht, Sol, Ins, 600V		FT	
232	6145-00-470-8255 (03570N)	Wire, Single Cond, #8 AWG, Blk, Sol, Ins, 600V		FT	
233	6145-00-943-0728 (03501C)	Wire, Elec, Tw, Str, #6 AWG, Wht, Ins, 600V		FT	
234	6145-00-923-2220 (03518W)	Wire, Elec, Tw, Str, #6 AWG, Blk, Ins, 600V		FT	
235	NSNR (23986F)	Wire, Elec, Tw, Str, #4 AWG, Yel, Ins, 600V, Anixter #68-0401		FT	
236	6145-00-417-5773 (19725B)	Wire, Single Conductor, Str, Ins, 600V, #4/0 AWG, Wht		FT	
237	6145-00-050-9079 (24863C)	Wire, Single Conductor, Str, Ins, 600V, #4/0 AWG, Blk		FT	
238	6145-00-184-3876 (03500B)	Wire, Elec, Tw, Str, #4 AWG, Wht, Ins, 600V		FT	
239	6145-00-184-5488 (03517H)	Wire, Elec, Tw, Str, #4 AWG, Blk, Ins, 600V		FT	
TOTAL AVAILABLE IN PROJECT COMMAND		TOTAL AVAILABLE IN PROJECT COMMAND		PAGE NO. 23	
FORM 1, APR 79		EDITION OF 1 AUG 72 IS OBSOLETE.		NO OF PAGES 23	

Figure 5-3. Bill of Materials for 48-V Dc, 200-A CEMF Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELEPHONE NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL AVAILABLE PROJECT	REQUIRE
1	NSNR (24450H)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 900 Ah, W/ 25-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Six 350 MCH Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-900	EA		
2	NSNR (24451K)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 1008 Ah, W/ 25-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Six 350 MCH Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCT-1008	EA		
3	NSNR (24452J)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 1020 Ah, W/ 25-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Six 350 MCH Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide GC-11	EA		
4	NSNR (24453Z)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 1950 Ah, W/ 25-InterCell Connector Kit for 1/2" Spacing, 1 Kit Intertier/Step Connectors, Six 350 MCH Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-1950	EA		

UNIT: OF 1 AUG 72 IS 0000-011

DATE: 12/1/76 0011-N

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility.

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AR 100-22, the predecessor agency is the United States Army Communications Command.									
LOCATION	SEIP 020	UNIT IDENT CODE							
TELETYPE NUMBER	48-V DC, 400-A END CELL BATTERY FACILITY	DATE	PAGE NO.	NO. OF PAGES					
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL PROJECT REQUIRED	AVAILABLE PROJECT	UNAVAILABLE PROJECT			
5	NSNR (24454A)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 2016 Ah, W/ 25-Intertier/Step Connectors, Six 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D LCI-2016	EA						
6	NSNR (24455B)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 2160 Ah, W/ 25-Intertier/Step Connectors, Six 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide GC-25	EA						
7	NSNR (24456C)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 1650 Ah, W/ 25-Intertier/Step Connectors, Six 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Gould NCX-1650	EA						
8	NSNR (24457D)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 3300 Ah, W/ 25-Intertier/Step Connectors, Six 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Numeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, C & D MCT-3300	EA						

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 100-22-1-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS			
For use of this form, see DA Form 100-20, 1 Aug 72, and the accompanying instructions in the United States Army Communications Center, Inc.			
SEIP 020		UNIT IDENT CASE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT
9	NSNR (24458E)	Battery Bank, Lead/Calcium-Acid, 26-Cell, 3260 Ah, w/ 25-Intercoil Connector Kit for 1/2" Spacing, 1 Kit Intercoil/Step Connectors, Six 350 MCM Lead-Plated Copper Terminal Lugs, Lifting Strap, Thermometer, Diffuser Vents, Hydrometer Holder, Cell Humeral Set, Seal Nut Wrench, Noncorrosive Grease and Four Customer Instruction Manuals, Exide GC-35	EA
10	NSNR (18132P)	Battery Rack, 2-Tier, C & D RD-901-9	EA
11	NSNR (24459F)	Battery Rack, 2-Tier, C & D RD-901-15	EA
12	NSNR (24460H)	Battery Rack, 2-Tier, C & D RD-901-20	EA
13	NSNR (24461L)	Battery Rack, 2-Tier, Gould S07-074479	EA
14	NSNR (24462K)	Battery Rack, 2-Tier, Gould S07-074488	EA
15	NSNR (24463J)	Battery Rack, 2-Tier, Exide 84844-96	EA
16	NSNR (24847H)	Battery Rack, 2-Tier, Exide 84539-84	EA

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 78 3971-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, the AIR 120-12, New P.C. about 19-193 in the United States Army Corps, Headquarters Command.									
UNIT IDENT CODE		DATE		PAGE NO.		NO. OF PAGES			
SEIP 020		48-V DC, 400-A END CELL BATTERY FACILITY		4		23			
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL AVAILABLE PROJECT FORWARDED	REQUIREMENT			
17	MSNR (24465A)	Battery Rack, 2-Tier, Exide 84540-60		EA					
18	MSNR (24466B)	Battery Rack, 2-Tier, Exide 84542-84		EA					
19	MSNR (24467C)	Battery Rack, 2-Tier, Seismic Zones 2, 3, and 4 Restraints, Gould 507-07488-666		EA					
20	MSNR (24468D)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84844-96		EA					
21	MSNR (24469E)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restraints, Exide 84787-96		EA					
22	MSNR (24470N)	Battery Rack, 2-Tier, Seismic Zone 4 Restraints, Exide 84754-96		EA					
23	MSNR (24471M)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84539-84		EA					
24	MSNR (24472L)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restraints, Exide 84793-168		EA					
25	MSNR (24473K)	Battery Rack, 2-Tier, Seismic Zone 4 Restraints, Exide 84760-168		EA					
26	MSNR (24474J)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84540-60		EA					

FORM 1 APR 78 3071-R

EDITION OF 1 AUG 73 IS OBSOLETE.

EDITION OF 1 AUG 78 IS OBSOLETE

DA FORM 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, the user must be authorized to use the information in the United States Army Communications Command.									
UNIT IDENT CODE									
SEIP 020									
48-V DC, 400-A END CELL BATTERY FACILITY									
ITEM NO.	STOCK NUMBER	NOMENCLATURE				UNIT	DATE	PAGE NO.	NO. OF PAGES
								5	23
27	NSMR (24475Z)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restraints, Exide 84798-96				EA			
28	NSMR (24476A)	Battery Rack, 2-Tier, Seismic Zone 4 Restraints, Exide 84765-96				EA			
29	NSMR (24477B)	Battery Rack, 2-Tier, Seismic Zone 1 Restraints, Exide 84542-84				EA			
30	NSMR (24478C)	Battery Rack, 2-Tier, Seismic Zones 2 and 3 Restraints, Exide 84800-120				EA			
31	NSMR (24479D)	Battery Rack, 2-Tier, Seismic Zone 4 Restraints, Exide 84767-120				EA			
32	NSMR (24480Y)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-9-EPI				EA			
33	NSMR (24481N)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-9-EPII				EA			
34	NSMR (24482M)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-901-15-EPI				EA			
35	NSMR (24483L)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-901-15-EPII				EA			
36	NSMR (24484K)	Battery Rack, 2-Tier, Seismic Zones 1 and 2 Restraints, C & D RD-616-20-EPI				EA			
37	NSMR (24485J)	Battery Rack, 2-Tier, Seismic Zones 3 and 4 Restraints, C & D RD-616-20-EPII				EA			

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 3871-R
1 APR 78

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
Per use of this form, see AR 102-22, the Amendment Policy in the United States Army Communications Command.				DATE	PAGE NO. 7
SEIP 020				UNIT	TOTAL INVOICED PROJECTS IN PROJECT COMMAND
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	EA	EA
49	NSNR (24495K)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-9-EPI	EA		
50	NSNR (24496J)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-9-EPI	EA		
51	NSNR (24497Z)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-903-15-EPI	EA		
52	NSNR (24498A)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-903-15-EPI	EA		
53	NSNR (24499B)	Battery Rack, 2-Step, Seismic Zones 1 and 2 Restraints, C & D RD-939-20-EPI	EA		
54	NSNR (24800F)	Battery Rack, 2-Step, Seismic Zones 3 and 4 Restraints, C & D RD-939-20-EPI	EA		
55	NSNR (24801G)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Gould S07-074517-333	EA		
56	NSNR (24802H)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074517-666	EA		
57	NSNR (24803M)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Gould S07-074526-333	EA		
58	NSNR (24804Z)	Battery Rack, 2-Step, Seismic Zones 2, 3, and 4 Restraints, Gould S07-074526-666	EA		
59	NSNR (24805A)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Exide 84557-96	EA		
60	NSNR (24806B)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restraints, Exide 84021	EA		

GOLDEN OF 1 AND 2 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see AR 103-22, the Department of Defense, the United States Army Communications Command.				DATE	
LOCATION				PAGE NO. NO. OF	
SEIP 020				8	
48-V DC, 400-A END CELL BATTERY FACILITY				TOTAL AVAILABLE	
NONVOLUME				PROJECT COMMAND	
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL AVAILABLE	
61	NSNR (24807C)	Battery Rack, 2-Step, Seismic Zone 4 Restraints, Exide 83988	EA		
62	NSNR (24808B)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Exide 84563-168	EA		
63	NSNR (24809E)	Battery Rack, 2-Step, Seismic Zone 2 and 3 Restraints, Exide 84027	EA		
64	NSNR (24810A)	Battery Rack, 2-Step, Seismic Zone 4 Restraints, Exide 83994	EA		
65	NSNR (24811F)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Exide 84568-96	EA		
66	NSNR (24812G)	Battery Rack, 2-Step, Seismic Zone 1 Restraints, Exide 84569-108	EA		
67	NSNR (24813H)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restraints, Exide 84043	EA		
68	NSNR (24814W)	Battery Rack, 2-Step, Seismic Zones 2 and 3 Restraints, Exide 84045	EA		
69	NSNR (24815Z)	Battery Rack, 2-Step, Seismic Zone 4 Restraints, Exide 84010	EA		
70	NSNR (24816A)	Battery Rack, 2-Step, Seismic Zone 4 Restraints, Exide 84012	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

FORM 103-22 5-71-1

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

(TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS)

Per use of this form, see AR 105-22, the proponent agency is the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE		PAGE NO. 1 OF 2	
TELETYPE NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE		TOTAL AVAILABLE FOR PROJECT	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	REQ FOR PROJECT	AVAIL. IN STOCK	REQ. QUANT.	AVAIL. QUANT.
71	NSNR (21661B)	Cabinet, Equipment, 19" Wide, 31" Deep, 84" Panel Mounting Space, Electric Blue, Modification Rear Door (Mod LS), Par-Metal #PC-8413	EA				
72	NSNR (21736F)	Cabinet Base, Recessed For 19" W X 31" Deep Cabinet, Par-Metal #CB-1931, Electric Blue	EA				
73	NSNR (24893Z)	Circuit Breaker Enclosure, 20" X 30" X 6-5/8", Equipped With 2-100A Main, 2-15A, 2-10A, And 26-5A DC Breakers, 200A Rtn Bus Bar, And Termination For 300 MCM Cable, Curtis Industries 271C7	EA				
74	NSNR (22112B)	Electrolyte, 5-Gal Container, 1.400 Specific Gravity	EA				
75	NSNR (22111A)	Electrolyte, 15-Gal Container, 1.400 Specific Gravity	EA				
76	NSNR (24411B)	Filter, Decentralizing, 48-V DC, 100A, 23" X 10-1/2" Rack Mounting, Lorain #4826-084	EA				
77	NSNR (24415F)	Filter, Decentralizing, 48-V DC, 50A, 23" X 7" Rack Mounting, Lorain #4826-065	EA				
78	5920-00-156-3681 (24401C)	Fuse Panel, 48-V DC, 23" X 10-1/2", Four 61-400A Fuse Positions, Lorain #4317-012	EA				
79	NSNR (21942H)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 31-60A Fuse Positions, Lorain #4317-009	EA				
80	NSNR (24129F)	Fuse Panel, 48-V DC, 23" X 5-1/4", Four 0-30A & Four 31-60A Fuse Positions, Lorain #4317-010	EA				
81	5920-00-878-4817 (18159K)	Fuse Panel, 48-V DC, 23" X 5-1/4", Eight 0-30A Fuse Positions, Lorain #4317-008	EA				

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd)

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
82		5920-00-156-3690 (244166)		Fuse Panel, 48-V DC, 23" X 3-1/2", Three 31-60A Fuse Positions, Lorain #4315-006	
83		5920-00-156-3683 (24417H)		Fuse Panel, 48-V DC, 23" X 3-1/2", Three 0-30A Fuse Positions, Lorain #4315-005	
84		NSNR (24418M)		Fuse Panel, 48-V DC, 19" X 1-3/4", (18) 0-5A Type 70 Fuses, Lorain #4317-408 Unmodified	
85		NSNR (22114D)		Fuse Panel, 48-V DC, 19" X 5-1/4", Three 0-30A And Three 31-60A Fuse Positions, Lorain #4316-506	
86		NSNR (18825D)		Fuse Panel, 48-V DC, 19" X 5-1/4", Six 0-30A Fuse Positions, Lorain #4316-505	
87		NSNR (21691J)		Fuse Panel, 48-V DC, 19" X 5-1/4", Six 31-60A Fuse Positions, Lorain #4316-507	
88		5920-00-177-2738 (21689H)		Fuse Panel, 48-V DC, 19" X 5-1/4", One 61-400A Fuse Position, Lorain #4314-012	
89		NSNR (24406H)		Inverter, 10-KVA, 48-V DC to 120-V AC, 1Ø, 50 Hz, Lorain #WAG103B	
90		NSNR (24407W)		Inverter, 10-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #WAG103B	
91		NSNR (18332N)		Inverter, 5-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #WAG502B	
92		NSNR (24409A)		Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #WAG202B	
93		NSNR (24410A)		Inverter, 2-KVA, 48-V DC to 120-V AC, 1Ø, 50/60 Hz, Lorain #WAG202B1	
DA FORM 1 APR 76 3071-R				EDITION OF 1 AUG 72 IS OBSOLETE.	

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

LOCATION		SEIP 020		UNIT IDENT CODE		PAGE NO. 11		PAGE NO. 11		PAGE NO. 11	
TELER NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		HOMENCLATURE		DATE		UNIT		TOTAL AVAILABLE FOR PROJECT COMMAND	
ITEM NO.	STOCK NUMBER										
94	NSNR (24408Z)	Inverter, 1-KVA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA102B		EA							
95	NSNR (21851E)	Inverter, 500-VA, 48-V DC to 120-V AC, 1Ø, 60 Hz, Lorain #AA501B		EA							
96	NSNR (22410C)	Kit, Emergency Battery Safety		EA							
97	5805-00-177-2919 (22113C)	Meter Panel Assembly, Consisting Of: Meter Panel, 19" X 5-1/4", 48-V DC, Rack Mounting; Equipped With a Ø- to 75-Volt DC Voltmeter (1% Accuracy) Lorain #4374-018		EA							
	NSNR (24419Z)	Ammeter, 0- to 400-Amp, Lorain #2925-778		EA							
	NSNR (24420Z)	Ammeter Shunt, 400A, Lorain #2982-717		EA							
	NSNR (24421A)	Shunt Mounting Block, Lorain #3815-102		EA							
98	NSNR (22110Z)	Power Board, 48 V, 400A, 23" Wide, Equipped With: (A) 400A Meter & Control Panel; (B) 400A, One-Step, End-Cell Switch For 3 End Cells; (C) Test Panel; and (D) Insulated 700A Ground Bar, Lorain #1241A3 List 4		EA							
99	5975-00-101-3525 (22202D)	Rack, Relay, 23" X 7", With 4 Cable Brackets Per Rack, Lorain #4124-010		EA							
100	NSNR (24366A)	Rectifier-Charger, 48-V DC, 200A; 3Ø, 208 V AC, 60 Hz; Lorain #RH200D50		EA							

DA FORM 1 APR 78 3971-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE		DATE		PAGE NO		NO OF PAGES	
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		48-V DC, 400-A END CELL BATTERY FACILITY		UNIT IDENT CODE		DATE		PAGE NO		NO OF PAGES	
ITEM NO.		STOCK NUMBER		NOMENCLATURE		UNIT		TOTAL AVAILABLE FOR PROJECT		REQUIREMENT	
101	6130-00-001-3508 (22232A)	Rectifier-Charger, 48-V DC, 200A; 3Ø, 380 V AC, 50/60 Hz; Lorain #RH200C50		EA		EA		12		23	
102	6130-00-004-0141 (24402D)	Rectifier-Charger, End Cell, 7 Volt, 25A Output, Lorain #RJ25F7, 115/230 V AC, 50/60 Hz		EA		EA					
103	NSNR (24422B)	Switch, Safety, Unfused Knife Blade, 3-Pole, 240 V AC, 200A, NEMA 1 Indoor Enclosure, Wall Mounting, Square D Type DU324		EA		EA					
104	5975-00-710-0876 (21705C)	Bushings, 2" OD, Chase Nipple, T&B #1947		EA		EA					
105	6145-00-845-5206 (15104A)	Cable, 1-Pr, #20 AWG, Str, Ins		FT		FT					
106	NSNR (21717D)	Cable, 3-Pr, #22, Str, Belden #9745		FT		FT					
107	6145-00-081-1049 (20933E)	Cable, Indiv Shld Cond, 11-Pr, #22 AWG, Sol, W/Gnd Wire, Belden #8765		FT		FT					
108	6145-00-051-9790 (03516G)	Cable, Single Cond, #2 AWG, Blk, Str		FT		FT					
109	6145-00-479-0036 (15130Y)	Cable, Single Cond, Str, Ins, 600V, #2/0 AWG, Wht		FT		FT					
110	6145-00-174-1123 (03494W)	Cable, Single Cond, Str, Ins, 600V, #2/0 AWG, Blk		FT		FT					
111	NSNR (21830F)	Cable, Single Cond, Str, Ins, 600V, 350 MCM, Wht, Anixter #68-3501		FT		FT					
112	6145-00-417-5797 (03755C)	Cable, Single Cond, Str, Ins, 600V, 350 MCM, Blk		FT		FT					

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 78 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd)

LOCATION		SEIP 020		UNIT IDENT CODE	
TELECOM NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		PAGE NO. OF PAGES	
		NOMENCLATURE		TOTAL AVAILABLE REQ FOR PROJECT COMMAND	
113	NSNR (24405G)	Capacitor Filter Panel, 19" X 7", For 48 V DC, 1AW Dwg STD-MS-0003	EA	12	23
114	NSNR (24404F)	Capacitor Filter Panel, 23" X 7", For 48 V DC, 1AW Dwg STD-MS-0003	EA		
115	NSNR (21819G)	Compound, Sealing, Nonhardening Permagum	BG		
116	5940-00-961-0477 (24412C)	Connector, Two-Way, #4/0 AWG-300 MCM, T&B #32513	EA		
117	5940-00-982-8096 (23219A)	Connector, Cable, Single Barrel For 300-500 MCM Copper Cable, T&B #32515	EA		
118	NSNR (24413D)	Connector, Cable, Double Barrel, For 300-500 MCM Copper Cables, T&B #32015-BD	EA		
119	NSNR (21725A)	Copper Strip, 1/2" Wide, 5" Long, 1/32" Thick	EA		
120	5340-00-754-4560 (00740C)	Expansion, Shield, 3/8" -16, Mach Bolt	EA		
121	5920-00-901-9936 (10333D)	Fuse, GMT 1, 1A	EA		
122	5920-00-857-8933 (24424D)	Fuse, GMT 2, 2A	EA		
123	5920-00-081-5958 (16582Y)	Fuse, GMT 3, 3A	EA		
124	5920-01-056-7256 (24425E)	Fuse, GMT 3-1/2, 3-1/2A	EA		

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 JAN 73 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.		STOCK NUMBER		NOMENCLATURE	
				UNIT	
				TOTAL AVAILABLE REQ FOR PROJECT COMMAND	
				PAGE NO. 14	
				NO. OF PAGES 23	
				TOTAL AVAILABLE REQ FOR PROJECT COMMAND	
125		5920-00-857-8417 (17144N)		Fuse, GMT 5, 5A	EA
126		NSNR (24831D)		Fuse, GMT 10, 10A, Lorain #2486-112	EA
127		5920-00-156-0838 (14624E)		Fuse, Grasshopper, 1-1/3A, Bussman 358	EA
128		5920-00-556-9728 (24430J)		Fuse, Grasshopper, 2A, Bussman 35L	EA
129		5920-00-156-0837 (16432K)		Fuse, Grasshopper, 3A, Bussman 35G	EA
130		5920-00-122-3775 (17237Z)		Fuse, Grasshopper, 5A, Bussman 35H	EA
131		5920-00-857-8418 (24431Z)		Fuse, Grasshopper, 7-1/2A, GTE D27087A11	EA
132		5920-00-624-2661 (24432A)		Fuse, Grasshopper, 10A, Burndy FIL01T5	EA
133		5920-00-539-6347 (24426F)		Fuse, Indicating, Type 70, 1-1/3A	EA
134		5920-00-284-9217 (24427G)		Fuse, Indicating, Type 70, 2A	EA
135		5920-00-284-9218 (24428H)		Fuse, Indicating, Type 70, 3A	EA
136		5920-00-538-6205 (23988H)		Fuse, Indicating, Type 70, 5A	EA

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 AUG 72 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

LOCATION SEIP 020				UNIT IDENT CODE			
TELECOMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				Per use of this form, see DA 105-22, the predecessor agency to the United States Army Communications Command.			
TELECOM NUMBER				DATE			
48-V DC, 400-A END CELL BATTERY FACILITY				PAGE NO. NO. OF PAGES			
ITEM NO.				TOTAL AVAILABLE TO FOR IN PROJECT COMMAND			
STOCK NUMBER				UNIT			
NOMENCLATURE				EA			
137	NSNR (24429W)	Fuse, Indicating, Type 70, 1/4A with 10 Ohm Resistor in Series, 250 V, Lorain #2486-203					
138	5920-00-665-0515 (24441J)	Fuse, 3AB, Alarm, 1A, Buss					
139	5920-00-195-2330 (24442Z)	Fuse, 3AB, Alarm, 1A, Littlefuse					
140	5920-00-295-7013 (24443A)	Fuse, 3AB, Alarm, 2A, Buss					
141	5920-01-007-5676 (24444B)	Fuse, 3AB, Alarm, 2A, Littlefuse					
142	5920-00-503-4843 (24445C)	Fuse, 3AB, Alarm, 3A, Buss					
143	5920-00-133-4898 (24446D)	Fuse, 3AB, Alarm, 3A, Littlefuse					
144	5920-00-806-3152 (24447E)	Fuse, 3AB, Alarm, 4A, Buss					
145	5920-01-007-5677 (24448F)	Fuse, 3AB, Alarm, 5A, Littlefuse					
146	NSNR (24449G)	Fuse, 3AB, 15A, 250 V, Littlefuse 314015					
147	NSNR (24433B)	Fuse, 5AG, Normal, 1A, Littlefuse 512001					
148	NSNR (24434C)	Fuse, 5AG, Normal, 2A, Littlefuse 512002					

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1, APR 75 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

LOCATION SEIP 020				UNIT IDENT CODE			
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				Per use of this form, the AR 160 221 and subsequent agency is the United States Army Communications Command.			
TELER NUMBER 48-V DC, 400-A END CELL BATTERY FACILITY				DATE			
STOCK NUMBER				NOMENCLATURE			
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL REQ FOR PROJECT COMMAND	PAGE NO. AVAILABLE IN PROJECT COMMAND	NO. OF PAGES REQUIRED
149	NSNR (24435D)	Fuse, 5AG, Normal, 3A, Littlefuse 512003		EA		16	21
150	5920-00-280-3469 (21724Z)	Fuse, 5AG, Normal, 5A, Littlefuse 512005		EA			
151	NSNR (24436E)	Fuse, 5AG, Normal, 8A, Littlefuse 512008		EA			
152	NSNR (24437F)	Fuse, 5AB, Normal, 10A, Littlefuse 514010		EA			
153	NSNR (24438G)	Fuse, 5AB, Normal, 15A, Littlefuse 514015		EA			
154	NSNR (24439H)	Fuse, 5AB, Slo-810, 5A, Littlefuse 523005		EA			
155	NSNR (21723M)	Fuse, 5AB, Slo-810, 10A, Littlefuse 523010		EA			
156	NSNR (24440K)	Fuse, 5AB, Slo-810, 15A, Littlefuse 523015		EA			
157	NSNR (24047A)	Fuse, One-Time, Non-Type, Cartridge, 6A, 250V, Lorain #2483-505		EA			
158	5920-00-904-2671 (18043Q)	Fuse, Type 70 (Indicating/Alarm) 1-1/3A, Lorain #2486-208		EA			
159	NSNR (21698F)	Fuse, One-Time, Non-Type, Cartridge, 30A, 250V, Lorain #2483-515		EA			
160	NSNR (21697E)	Fuse, One-Time, Non-Type, 50A, 250V, Lorain #2483-523		EA			

DA FORM 1 APR 76 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

LOCATION		SEIP 020		TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		UNIT IDENT CODE	
TELETYPE NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE		PAGE NO. NO. OF PAGES	
ITEM NO.		STOCK NUMBER		NOMENCLATURE		UNIT	
161	NSNR (21839E)			Fuse, Link, 250A, 250V, Lorain #2484-645		EA	
162	5920-00-J01-3496 (21840E)			Fuse, Link, 400A, 250V, Lorain #2484-651		EA	
163	NSNR (21729E)			Fuse Block, For 5AG Fuses, 10 Poles, Screw Terminals, Littlefuse #556010		EA	
164	NSNR (21709G)			Fuse Panel Bus Bar, 4 Panels, Lorain #3476-513		EA	
165	NSNR (23200A)			Ground Bar, Copper, 0-1000A, 23" Mtg, Lorain #4361-042		EA	
166	NSNR (23220J)			Ground Bar, Copper, 0-700A, 19" Mtg, Lorain #4361-039		EA	
167	5940-00-J01-3520 (21712M)			Ground Terminal Strip, Lorain #4835-530		EA	
168	NSNR (21695C)			Heat Baffle, 23" X 3-1/2", Lorain #4133-024		EA	
169	NSNR (23946Z)			Heat-Shrink Insulator, 500-1000 MCM, 9" Lg, T&B HS500-1000, Pkg of 5		PKG	
170	NSNR (23313D)			Insulating Mounting Assembly For 23" Ground Bar, 4", Lorain #4133-036		EA	
171	NSNR (217268)			Jumper, Square D, Type 9080-JCA-6		EA	
172	NSNR (23922H)			Key Switch, 3C, Lorain #2523-314		EA	
DA FORM 1 APR 78		3071-R		EDITION OF 1 AUG 72 IS OBSOLETE.		TOTAL AVAILABLE PROJECT EQUIPMENT REQUIRED	

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

LOCATION SEIP 020				UNIT IDENT CODE			
TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				Per use of this form, see AR 105-22; this preprint agency is the United States Army Communications Command.			
48-V DC, 400-A END CELL BATTERY FACILITY				DATE			
ITEM NO.				PAGE NO. 18			
STOCK NUMBER				TOTAL AVAILABLE PROJECT COMMAND			
NOMENCLATURE				UNIT			
173	5975-00-642-7263 (02622D)	Locknut, Conduit, 2", T&B #146	EA				
174	5940-00-101-3498 (21710G)	Lug Adapter, Angle, Lorain #3627-531	EA				
175	5180-00-101-3522 (21708F)	Lug Kit, #14-4 AWG, Lorain #4835-523	EA				
176	5180-00-101-3523 (21824A)	Lug Kit, #4-3/0 AWG, Lorain #4835-526	EA				
177	NSNR (239400)	Lug Kit, #1/0 AWG-500 MCM, Lorain #4835-528	EA				
178	5180-00-101-3518 (21711H)	Lug Kit, #1/0 AWG-350 MCM, Lorain #4835-527	EA				
179	5940-00-636-5015 (10397B)	Lug, Locktite, #4 AWG, T&B #31007	EA				
180	5940-00-848-8847 (21720F)	Lug, Terminal, #22 AWG, T&B STA-KOM, RA-1123	EA				
181	NSNR (23942F)	Mounting Channel, Square D, Type 1828-C22X38	EA				
182	5310-00-141-3034 (09727C)	Nut, Hex, Brass, 1/4-20	EA				
183	5310-00-550-2490 (07675L)	Nut, Plain, Hex, Steel, Cad Pltd, #8-32	EA				
184	5310-00-285-1650 (00558H)	Nut, Plain, Hex, Steel, Cad Pltd, 1/4-20	EA				

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 3071-R
1 APR 78

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS
 For use of this form, see AR 105-22; the procuring agency is the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT COMMAND	PAGE NO. 19
185	NSHR (24414E)	Panel, Ac Outlet, 23" X 3-1/2", 1AW Dwg STD-MS-0017	EA		
186	5975-00-937-4583 (00879Z)	Panel, Blank, 19" X 1-3/4" X 1/8", Grey	EA		
187	5975-00-975-4448 (15288K)	Panel, Blank, 19" X 5-1/4" X 1/8", Grey	EA		
188	5975-00-051-7337 (03034K)	Panel, Blank, 19" X 7" X 1/8", Grey	EA		
189	NSNR (21767M)	Panel, Blank, 19" X 10-1/2", Lorain #3541-111	EA		
190	NSHR (20942M)	Panel, Blank, 23" X 1-3/4", Lorain #3531-106	EA		
191	NSNR (20961F)	Panel, Blank, 23" X 3-1/2", Lorain #3532-112	EA		
192	5975-00-J01-3512 (20979C)	Panel, Blank, 23" X 5-1/4", Lorain #3533-106	EA		
193	5975-00-J01-3513 (20960E)	Panel, Blank, 23" X 7", Lorain #3534-103	EA		
194	NSNR (209788)	Panel, Blank, 23" X 8-3/4", Lorain #3535-102	EA		
195	5975-00-J01-3530 (21827D)	Panel, Termination, 23" X 3-1/2", 700A, Lorain #4341-514	EA		
196	NSNR (21846A)	Protective Screening For Dc Control Rack, 23" Wide X 36" High, Lorain #4141-406	EA		

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS
 For use of this form, see DA 105-22, this document Agency in the United States Army Communications Command.

LOCATION		SEIP 020		UNIT IDENT CODE	
TELER NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	DATE
197	MSNR (218478)	Protective Screening For Dc Control Rack, 23" Wide X 48" High, Lorain #4141-407		EA	20
198	5305-00-206-3713 (09098X)	Screw, Mach, Pan Hd, Steel, Cad Pltd, 8-32 X 1" Lg		EA	20
199	5305-00-059-7815 (24423C)	Screw, Mach, Steel, Cad Pltd, 10-32 X 1" Lg, Pan Head, Phillips		EA	20
200	5305-00-001-3733 (19746A)	Screw, Mach, 10-32 X 3/4" Lg, Par-Metal GSC10-3, Lt Grey, W/Molded Nylon Washer		HD	20
201	5305-00-639-7970 (13953E)	Screw, Mach, 12-24 X 3/4", Pan Hd		EA	20
202	5305-00-935-7581 (19640Y)	Screw, Cap, Brass, 1/4-20 X 5/8" Lg		EA	20
203	5305-00-988-1727 (10130J)	Screw, Mach, Steel, Cad Pltd, 1/4-20 X 1" Lg		EA	20
204	5305-00-022-7798 (00230J)	Screw, Cap, 3/8-16 X 1-1/2", Hex Hd, Steel		EA	20
205	MSNR (21562C)	Side Panel, For 31" Deep Cabinet, Blue, Par-Metal #CS-843		EA	20
206	MSNR (23202C)	Switch, Miniature, Toggle, Dpdt, Radio Shack Cat. No. 275-1546		EA	20
207	5970-00-295-8161 (23204E)	Tape, Insulating, Elec, White, 3/4" Wide X 216', 1500 V		RL	20
208	5970-00-816-6056 (13561K)	Tape, Insulating, Elec, Black, 3/4" Wide X 108 In		RL	20

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1, APR 78 3071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

SEIP 020

LOCATION SEIP 020				TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS			
48-V DC, 400-A END CELL BATTERY FACILITY				Per use of this form, see AF 105-22, the procuring agency is the United States Army Communications Command.			
ITEM NO.	STOCK NUMBER	NOMENCLATURE	DATE	UNIT	PAGE NO.	OF	REVISIONS
209	5820-00-101-3310 (21956A)	Terminal Block, Square D, Type 9080-CA-10		EA	21	1	
210	NSHR (23199Z)	Terminal Strip, Barrier, Twin-Screw, 22 Positions, Curtis #1522 ST		EA			
211	NSHR (21704B)	Transient Peak Limiter, 19" X 7" (One Carl E. Holmes Co SS20HX3EC2 Limiter With 60A CB) IAW Dwg STD-MS-0023		EA			
212	NSHR (24403E)	Transient Peak Limiter Panel, 23" X 7", >60V, 520A (Two Carl E. Holmes Co SS20HX3EC2 Limiters With 60A CBs) IAW Dwg STD-MS-0023		EA			
213	NSHR (23913Z)	Vertical Side Support Set, 87" Lg, Par-Metal #CVS-84, Set of 4 with McG Bolts		SET			
214	5310-00-167-0833 (00487C)	Washer, Flat, Steel, Cad Pltd, #8		EA			
215	5310-00-167-0834 (00488D)	Washer, Flat, Steel, #10		EA			
216	5310-00-141-1795 (14518W)	Washer, Flat, Steel, Cad Pltd, 1/4"		EA			
217	5310-00-754-4337 (06124L)	Washer, Flat, Brass, 1/4"		EA			
218	5310-00-087-7493 (08653A)	Washer, Flat, Steel, 3/8"		EA			
219	5310-00-045-3299 (09019J)	Washer, Lock, Split, Steel, Cad Pltd, #8		EA			

DA FORM 2071-R

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS
For use of this form, see AR 105-22; the procuring agency is the United States Army Communications Command.

LOCATION SEIP 020			UNIT IDENT CODE		
48-V DC, 400-A END CELL BATTERY FACILITY					
ITEM NO.	STOCK NUMBER	DESCRIPTION	UNIT	TOTAL AVAILABLE FOR PROJECT COMMAND	PAGE NO. NO. OF PAGES
220	5310-00-045-3296 (00483J)	Washer, Lock, Split, Steel, #10	EA	22	22
221	5310-00-808-5381 (10231A)	Washer, Lock, Split, Steel, Cad Pltd, 1/4"	EA		
222	5310-00-637-9541 (00586C)	Washer, Lock, Split, Steel, 3/8"	EA		
223	NSUR (15954C)	Wire, Elec, Tw, #20 AWG, Blu, Str, Ins, 600V, Belden #8919-13	FT		
224	6145-00-681-8374 (09217J)	Wire, Elec, Tw, #18 AWG, Wht, Str, Ins	FT		
225	6145-00-524-9130 (23193Y)	Wire, Elec, Tw, #18 AWG, Blk, Str, Ins	FT		
226	6145-00-050-7405 (03540K)	Wire, #14 AWG, Blk, Sol, 600V, Ins	FT		
227	6145-00-050-7407 (03509A)	Wire, #14 AWG, Wht, Sol, 600V, Ins	FT		
228	6145-00-089-6811 (11672A)	Wire, Elec, Tw, #18 AWG, Red, Sol, Ins, 600V	FT		
229	6145-00-990-3000 (03507W)	Wire, Single Cond, #10 AWG, Wht, Sol, Ins, 600V	FT		
230	6145-00-990-2999 (03538G)	Wire, Single Cond, #10 AWG, Blk, Sol, Ins, 600V	FT		
231	6145-00-473-0042 (06535A)	Wire, Single Cond, #8 AWG, Wht, Sol, Ins, 600V	FT		

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see A9 109-22; the proponent agency is the United States Army Communications Command.									
LOCATION		SEIP 020		UNIT IDENT CODE					
TELETYPE NUMBER		48-V DC, 400-A END CELL BATTERY FACILITY		DATE		PAGE NO. 23		NO OF PAGES 23	
ITEM NO.	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL REQUIRED FOR PROJECT	AVAILABLE IN COMPANY	REQUIRED		
232	6145-00-470-8255 (03570X)	Wire, Single Cond, #8 AWG, Blk, Sol, Ins, 600V		FT					
233	6145-00-943-0728 (03501C)	Wire, Elec, Tw, Str, #6 AWG, Wht, Ins, 600V		FT					
234	6145-00-923-2220 (035184)	Wire, Elec, Tw, Str, #6 AWG, Blk, Ins, 600V		FT					
235	6145-00-184-3876 (035008)	Wire, Elec, Tw, Str, #4 AWG, Wht, Ins, 600V		FT					
236	6145-00-184-5488 (03517H)	Wire, Elec, Tw, Str, #4 AWG, Blk, Ins, 600V		FT					
237	5310-00-516-6948 (10674D)	Nut, Hex, Brass, #10		EA					

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-4. Bill of Materials for 48-V Dc, 400-A End Cell Battery Facility (Contd).

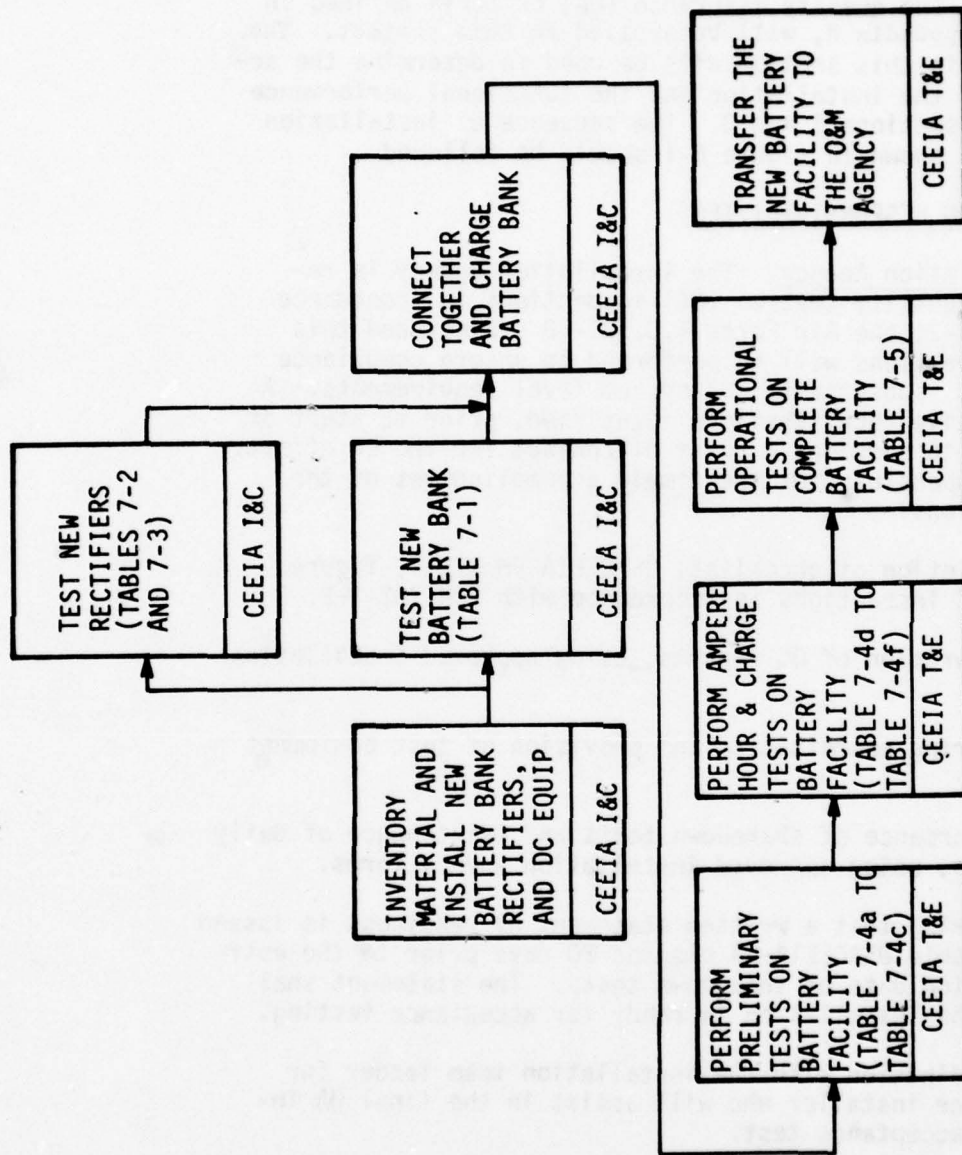
SECTION 6. QUALITY ASSURANCE PROCEDURES

6.1 GENERAL. The quality assurance (QA) criteria defined in CCR 702-1-2, appendix F, will be applied to this project. The QA procedures in this section will be used to determine the acceptability of the installation and the functional performance as defined in sections 1 and 3. The sequence of installation and test steps shown in figure 6-1 should be followed.

6.2 INSPECTION RESPONSIBILITIES.

6.2.1 Installation Agency. The installation agency is responsible for quality control (QC) inspections in accordance with CCR 702-1-2, the Air Force T.O. 31-10 series, and this SEIP. QC inspections will be performed to ensure compliance with equipment, subsystems, and system level requirements. A QC representative (QCR) shall be identified, prior to start of installation, to serve as a point of contact for the QC effort. The QCR is responsible for the timely accomplishment of the following actions:

- a. Completion of checklist, USACEEIA FM 112-R, figure 6-2, during QC inspections in accordance with CCR 702-1-2.
- b. Preparation of QC reports, using approved installation agency forms.
- c. Ensuring coordination and provision of test equipment required.
- d. Performance of shakedown tests and maintenance of daily log of results, using approved installation agency forms.
- e. Ensuring that a written statement of readiness is issued to the applicable USACEEIA-QA element 20 days prior to the estimated completion date of shakedown tests. The statement shall verify that the installation is ready for acceptance testing.
- f. Coordination with the installation team leader for identifying one installer who will assist in the final QA inspection and acceptance test.
- g. Ensuring that QC discrepancies are corrected and that installation rework is performed, if test results are not satisfactory.



I&C--INSTALLATION & CONSTRUCTION

T&E--TEST AND EVALUATION

Figure 6-1. Installation and Test Sequence.

h. Coordinating the availability of QC inspection records and related installation documents for the QA representative/test director, identified as the quality assurance representative (QAR).

6.2.2 Testing Agency. The testing agency is responsible for periodic in-process QA checks, final QA inspection, and acceptance testing in accordance with provisions of USACEEIA Regulation 702-3. QA inspections will be performed to monitor the QC effort and to ensure that the installation meets the required performance parameters at the equipment, subsystem, and system levels, as applicable. A QAR will be identified, prior to start of installation, to serve as a point of contact for the QA and test effort and to ensure that the following actions are taken in a timely manner:

a. Establish a QA program that monitors the QC and installation efforts to ensure compliance with stated requirements.

b. Record the information required by figure 6-3, pertaining to cognizant agency, command, and facility points of contact.

c. Review QC and installation records and perform periodic in-process QA inspections, if deemed necessary because of the size and complexity of the installation, and report discrepancies to the responsible agency. Recommendations for corrective action will be included in any discrepancy reports.

d. Perform a final QA inspection in accordance with CCR 702-1-2.

e. Conduct functional performance tests in accordance with section 7 to determine if the installed equipment, subsystem, or system meets the required performance parameters. If the results of any portion of the acceptance test are not satisfactory, corrective action will be taken immediately by on-site personnel, if possible. If discrepancies are resolved, the QAR may retest to verify the results and continue the acceptance test. If discrepancies cannot be corrected immediately, the QAR may reject the equipment, subsystem, or system or attempt to complete the test with exceptions. Exceptions will be noted in the final test and acceptance report.

f. Record and analyze test results, prepare a final test and acceptance report, and make distribution in accordance with CCCR 702-2.

6.2.3 Operating Agency. The operating agency is responsible for providing support during installation and test. An operations and maintenance (O&M) representative shall be identified, prior to start of installation, to serve as the point of contact for the project and to ensure that the following actions are taken in a timely manner:

- a. Provide administrative supplies and typing support.
- b. Assist in resolution of discrepancies.
- c. Make operation and maintenance personnel available to assist on an as-required basis.
- d. Provide a representative to witness the acceptance test and sign the Technical Acceptance Recommendation (TAR).

6.3 DOCUMENTATION.

6.3.1 Quality Control Documentation. The installation QC will be documented using a QC checklist similar to figure 6-2 and the approved installation agency report forms. A QC inspection log will be maintained on a daily basis during inspection periods. The daily log may be in any format unless installation agency policy dictates otherwise.

6.3.2 Quality Assurance Documentation. QA inspections will be documented using a QA checklist similar to figure 6-2; the sample cognizant agency, command, and facility points of contact form, figure 6-3; and the QC checklist, figure 6-4. The final QA inspection shall be documented using the TAR forms shown in section 8. The Test and Acceptance Report shall be in accordance with CCCR 702-2. A QA inspection log will be maintained on a daily basis during inspection periods. The daily log may be in any format unless testing agency policy dictates otherwise.

6.4 QUALITY ASSURANCE PLAN. The inspection responsibilities assigned in this section constitute the QA plan and establish an independent evaluation loop. The evaluation loop consists of the installation agency QC effort and the testing agency QA and test effort. Acceptance of the installation by the O&M command is contingent upon the successful demonstration, during acceptance testing, that the installed equipment meets required performance parameters. A coordinated effort during the installation effort between the installation, testing, and operating agency personnel is required to assure that the highest standards of quality are maintained in accordance with QA procedures.

6.4.1 QA inspections and tests may be interrupted at any point if disrupted by a hardware malfunction. They also may be interrupted at a compatible breaking point to permit scheduled duty breaks. Any inspection that is interrupted because of a hardware malfunction shall be restarted at a point determined by the QAR.

6.4.2 Spare equipment may be substituted for malfunctioning equipment with the approval of the QAR. Any equipment that has been replaced shall be repaired and reinspected.

6.4.3 During acceptance tests, any piece of equipment (including items such as cables and conduits) may not be changed or adjusted without the approval of the QAR.

SEIP 020

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 1 OF 11 PAGES		
		DATE (Day, Mo, Year)		
SITE		LOCATION		
PROJECT NAME		TASK NO.		
REFERENCED T.O. FOR QUALITY OBSERVATIONS FOLLOW MAIN PARAGRAPHS				
		YES	NO	NA
A. <u>Drawings and Specifications</u> (AFTO 31-10-3, 31-10-9, 31-10-27, 31-10-29)				
1. Are floor plan drawings available?				
2. Are equipment location drawings available?				
3. Are face layout drawings of equipment in bays available?				
4. Are drawings for distribution frame block assignments available?				
5. Are pin connections on terminal blocks shown on drawings?				
6. Is stenciling of terminal blocks shown on drawings?				
7. Are drawings of power distribution equipment available?				
8. Are wire sizes indicated on drawings?				
9. Are schematic diagrams of circuit types to be installed included in drawings?				
10. Are drawings of site grounding systems available?				
11. Are drawings showing arrangement of cable racks, ducts, and trenches available?				
12. Do specifications contain list of reference material required by installers?				
13. Do specifications contain cable running list for power distribution?				
14. Do specifications contain cable running list for signal cabling?				

USACEEIA FM 112-R
1 JAN 79

Figure 6-2. QA Inspection Checklist - Installation.

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 2 OF 11 PAGES		
		YES	NO	NA
15. Do specifications contain cable running list for RF cabling?				
16. Do specifications contain detailed information on grounding?				
17. Do specifications contain details on all special instructions for installers?				
18. Do drawings reference all applicable items on BOM?				
B. <u>Tools and Equipment</u> (AFTO 31-10-29)				
1. Is equipment damaged or unserviceable?				
2. Are all installation materials on hand and serviceable?				
3. Are all tools necessary for completion of the job on hand?				
4. Is all test equipment needed for test and checkout of installation available?				
C. <u>General Safety Practice</u> (AFTO 31-10-29)				
1. Are goggles being worn when drilling and grinding?				
2. Are sharp edges left on frame or duct work?				
3. Are all hand tools properly used?				
4. Are electric power tools properly grounded?				
D. <u>Floor Plan Layout</u> (AFTO 31-10-9, 31-10-29)				
1. Are equipment layout plans in accordance with drawings?				
2. Was layout plan completed before equipment was moved into area?				
E. <u>Erecting and Mounting</u> (AFTO 31-10-29)				
1. Is equipment laid out in accordance with floor plan drawing?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 3 OF 11 PAGES		
		YES	NO	NA
2.	Are equipment bays level and plumbed within tolerances?			
3.	Has proper spacing been provided between equipment racks?			
4.	Are base angles of frames secured to floor in proper location?			
5.	Are all cabinets flush mounted and plumbed?			
6.	Has finish of equipment, cabinets, and racks been touched up?			
7.	Are bolts and screws free from stripped threads and defaced heads?			
8.	Have sufficient clearances been provided between apparatus for heat dissipation?			
9.	Are terminal blocks aligned on distribution frames?			
10.	Has equipment been installed in cabinets or racks in accordance with face layouts?			
11.	Are all nuts and bolts securely tightened?			
12.	Are exposed or cut ends of metal filed smooth and painted?			
13.	Have lock and flat washers been used?			
14.	Is the C-E equipment BOM available at the facility?			
15.	Has the C-E equipment been inventoried and discrepancies posted?			
16.	Is all required C-E equipment at the site?			
17.	Is all C-E equipment installed?			
F. <u>Cable Racks</u> (AFTO 31-10-6)				
1.	Location of cable racks:			
a.	Are cable racks located in accordance with cable plan drawing?			

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 4 OF 11 PAGES		
		YES	NO	NA
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?				
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?				
d. Are cable racks located so cables are not subject to damage or exposure or other detrimental conditions?				
2. Assembly of cable racks:				
a. Are long sections of cable racks used where possible?				
b. Have clamping details been altered other than where necessary to avoid interference?				
c. Are open ends of cable racks properly closed?				
d. Are vertical cable racks properly terminated on floors?				
3. Support of cable racks:				
a. Are cable racks properly supported and fastened?				
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?				
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?				
d. Has support been provided within 3 feet of free end of cable rack?				
e. Are cable racks braced where necessary to prevent sway?				
G. <u>Running Cable</u> (AFTO 31-10-13)				
1. Are cable runs made in accordance with cable running list?				
2. Are cables twisted or crossed on cable rack?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)	PAGE 5 OF 11 PAGES		
	YES	NO	NA
3. Do cables at turns or bends conform to the bending radii and position?			
4. Is protection provided where cable sheaths contact rough or sharp edges or metal?			
5. Are cables which are turned off over side of cable racks formed with minimum allowable radii?			
6. Are cables turned off rack horizontally and then up?			
7. Do cables to the distribution frame enter on the vertical side?			
8. Are cables serving the horizontal side of a distribution frame secured to the transverse arms near the vertical upright?			
9. Are cable tags properly prepared and in accordance with the cable running list?			
10. Are cable tags secured at each end of cable run?			
11. Have cable tags been removed upon completion of verification and termination?			
12. Are cable butts located as near as practicable to the point where the first wires turn out?			
13. Are cable butts properly treated?			
14. Is insulation of wires undamaged at butt location?			
15. Are unused and spare wires protected at butt location?			
H. <u>Securing Cable</u> (AFTO 31-10-2, 31-10-13)			
1. Is starting stitch properly made and placed?			
2. Is required Kansas City stitch properly made?			
3. Are first and succeeding layers of cable properly secured?			

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 6 OF 11 PAGES		
		YES	NO	NA
4. Are cables secured at every cable rack cross strap?				
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?				
6. Are lock stitches properly made and spaced?				
7. Are splices in twine properly made?				
I. <u>Sewed Forms</u> (AFTO 31-10-13)				
1. Is proper size twine used for the diameter of the form?				
2. Are proper number of strands used?				
3. Are stitches properly spaced?				
J. <u>Butting and Stripping</u> (AFTO 31-10-13)				
1. Are proper tools used for butting and stripping of cable?				
2. Are cable butts properly dressed?				
3. Is proper distance maintained from cable butt to fanning strip?				
K. <u>Fanned Forms</u> (AFTO 31-10-2)				
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?				
2. Are conductors in fanned forms twisted and bunched?				
3. Are fanned forms straight and taut from butt location to fanning strip?				
4. Is length of skimmers correct?				
5. Has color code been properly followed?				
6. Are spare wires disposed of properly?				
L. <u>Stenciling</u> (AFTO 31-10-27, 31-10-29)				
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 7 OF 11 PAGES		
		YES	NO	NA
2. Are designations located correctly?				
3. Are correct size designations used on particular types of apparatus or equipment?				
M. Strapping (AFTO 31-10-16)				
1. Are straps properly placed?				
2. Is correct type of strap wire used?				
3. Does insulation extend to terminal?				
4. Are straps placed so as not to interfere with operation of apparatus?				
5. Is removal of apparatus blocked?				
6. Are designations of apparatus obscured?				
N. Connecting and Soldering (AFTO 31-10-7)				
1. Is soldering clamp used when connecting wires?				
2. Are connections made on terminal blocks in proper manner?				
3. Is all soldering done with standard rosin core solder?				
4. Are connections secure and free of foreign substances?				
5. Has all unsightly flux and excess globules of solder been removed?				
6. Is insulation on skimmers burnt or otherwise damaged?				
7. Do skimmers on connected terminals exceed 1/16 in?				
8. Are all conductors given a continuity test after connection is made?				
O. Wrapped Connections (AFTO 31-10-7)				
1. Are wrapped connections applied only on suitable terminals?				
2. Are connections essentially straight and free of angular bends or crimps?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 8 OF 11 PAGES		
		YES	NO	NA
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?				
4. Are wrapped connectors soldered where applicable?				
P. <u>Cross Connections</u> (AFTO 31-10-11)				
1. Are jumpers properly routed at distribution frame?				
2. Do jumpers have sufficient slack after connection?				
3. Are conductors twisted between fanning strip and terminal?				
4. Does twist remain in conductors beyond rear of fanning strip?				
5. Are jumpers properly dressed?				
6. Has excess solder been removed from terminals?				
Q. <u>Equipment and Signal Grounds</u> (AFTO 31-10-24, 31-10-29)				
Are equipment and signal grounds installed in accordance with applicable codes and standards and in accordance with installation drawings?				
R. <u>Conduit</u> (AFTO 31-10-12)				
1. Are burrs removed from conduit after cutting?				
2. Is bending radii of conduit adequate?				
3. Are there more than four 90-degree bends in a single conduit run?				
4. Does number of conductors in conduit conform?				
5. Are conduits supported at intervals not exceeding 6 feet?				
6. Have all fittings been tightened after installation?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 9 OF 11 PAGES		
		YES	NO	NA
S. <u>Ducts (RF Shieldings)</u> (AFTO 31-10-12, 31-10-13)				
1. Are hangers for overhead ducts mounted first?				
2. Is proper type mallet used in assembly?				
3. Are flange sections cleaned before installation?				
T. <u>Coaxial Cables</u> (AFTO 31-10-14)				
1. Is cable inspected for possible damage prior to installation?				
2. Where required, is cable sewed in same manner as signal cable?				
3. Is butting and stripping done in same manner as signal cable?				
4. Do cable tags remain on coaxial cable from antenna to RF patch or equipment?				
5. Is support spacing of cables installed as prescribed (3 ft for cable 1-5/8 in or smaller and 5 ft for cables 1-11/16 in or greater)?				
6. Does bending radii of cables meet prescribed standards of the T.O.?				
U. <u>Waveguides and Antennas</u> (AFTO 31R-10-5, CEEIA PAM 105-3)				
1. Are waveguides stored in a horizontal manner and away from heavy objects?				
2. Are waveguides inspected for possible damage prior to installation?				
3. Are waveguides cleaned in the proper manner prior to installation?				
4. Are hangers installed every 5 feet as prescribed?				
5. Do waveguide bends conform to T.O. criteria?				
6. Are antennas and reflectors mounted as prescribed heights?				
7. Are antennas oriented to the prescribed azimuth?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 10 OF 11 PAGES		
		YES	NO	NA
V. <u>Outside Plant Inspection</u> (AFTO 31R-10-5, 31-10-5, 31-10-3, 31-10-10, 31-10-21, 31-10-24, 31-10-28)				
1. Are antenna tower locations proper?				
2. Are footings or pads prepared prior to concrete pour?				
3. Have concrete pours for footings and pads been accomplished in accordance with specified criteria?				
4. Has proper cure time been achieved prior to mounting steel?				
5. Is the tower constructed in accordance with the specified criteria, drawings, etc?				
6. Are the antenna supports, anchors, pedestals, etc., properly installed in accordance with established criteria?				
7. Are supporting structures, guy wires, tower lighting kits (when required), termination boxes, and baluns included and properly installed in accordance with established criteria?				
8. Are antennas properly mounted and aligned?				
9. Were antenna reflectors properly aligned prior to mounting the feed horn?				
10. Are antenna curtains for rhombic and log periodics properly installed?				
11. Are transmission lines, coaxial cables, waveguides, etc., properly installed?				
12. Has tower and supporting structure been painted in accordance with established criteria?				
13. Are waveguides, cable runs, etc., properly installed and protected?				
W. <u>Power Buildings</u> (AFTO 31-10-3, 31-10-29)				
1. Are power buildings and pads properly located and installed?				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 11 OF 11 PAGES		
		YES	NO	NA
2. Are generators and power distribution panels properly located and installed?				
3. Are oil pans properly installed?				
4. Are generators properly vented from the buildings?				
5. Has all required wiring been installed?				
6. Are fuel tanks installed above ground; if so, are they located at the proper distance from generator building?				
7. If fuel tanks were installed underground, was it accomplished in accordance with established procedures?				
8. Is safety equipment located in generator building?				
X. <u>Installation Drawings</u> (AFTO 31-10-29)				
Have drawings been reviewed to assure "as built" accuracy?				
_____ TEST ENGINEER/QUALITY ASSURANCE REPRESENTATIVE (QAR)				

Figure 6-2. QA Inspection Checklist - Installation (Continued).

COGNIZANT AGENCY, COMMAND, AND
FACILITY QA POINTS OF CONTACT
(CCCR 702-2)

	<u>Individual POC</u>	<u>Bldg. No.</u>	<u>Rm. No.</u>	<u>Phone No.</u>	<u>Name of Agency</u>
<u>Installation:</u>					
Team Leader	_____	_____	_____	_____	_____
Assistant Team Leader	_____	_____	_____	_____	_____
Quality Control	_____	_____	_____	_____	_____
<u>Quality Assurance Agency:</u>					
Representative	_____	_____	_____	_____	_____
Testing Activity	_____	_____	_____	_____	_____
<u>Operating Agency:</u>					
Representative	_____	_____	_____	_____	_____
Site Commander	_____	_____	_____	_____	_____

USACEEIA FM 113-R
1 JAN 79

Figure 6-3. QA Points of Contact.

SEIP 020

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 1 OF 7 PAGES		
		DATE (Day, Mo, Year)		
SITE	LOCATION	QUALITY CONTROL REPRESENTATIVE (QCR)		
PROJECT NAME		TASK NO.		
A. <u>General Safety Practice</u>		YES	NO	NA
1. Are goggles being worn when using grinding machines?				
2. Are sharp edges left on frame or duct work?				
3. Are all hand tools properly used?				
4. Are electric power tools properly grounded?				
5. Are ground wires securely attached?				
B. <u>Floor Plan Layout</u>				
1. Are layout plans in accordance with drawings?				
2. Was layout plan completed before equipment was moved into area?				
C. <u>Erecting and Mounting</u>				
1. Is equipment laid out in accordance with floor plan drawing?				
2. Are equipment bays leveled and plumbed within tolerances?				
3. Has proper spacing been provided between equipment racks?				
4. Are base angles of frames secured to floor in proper location?				
5. Are all cabinets flush mounted and plumbed?				
6. Has finish of equipment, cabinets, and racks been touched up?				
7. Are bolts and screws free from stripped threads and defaced heads?				

USACEEIA FM 111-R
1 JAN 79

Figure 6-4. QC Checklist - Installation.

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 2 OF 7 PAGES		
		YES	NO	NA
8. Have sufficient clearances been provided between apparatus for heat dissipation?				
9. Are terminal blocks aligned on distributing frames?				
10. Has equipment been installed in cabinets or racks in accordance with face layouts?				
11. Are all nuts and bolts securely tightened?				
12. Are exposed or cut ends of metal filed smooth and painted?				
D. <u>Cable Racks</u>				
1. Location of cable racks:				
a. Are cable racks located in accordance with cable plan drawing?				
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?				
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?				
d. Are cables located so they are not subject to damage due to exposure or other detrimental conditions?				
2. Assembly of cable racks:				
a. Are long sections of cable racks used where possible?				
b. Have clamping details been altered other than where necessary to avoid interference?				
c. Are open ends of cable racks properly closed?				
d. Are vertical cable racks properly terminated on floors?				
3. Support of cable racks:				
a. Are cable racks properly supported and fastened?				
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?				

Figure 6-4. QC Checklist - Installation (Continued).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 3 OF 7 PAGES		
	YES	NO	NA
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?			
d. Has support been provided within 3 feet of free end of cable rack?			
e. Are cable racks braced where necessary to prevent sway?			
E. Running Cable			
1. Are cable runs made in accordance with cable running list?			
2. Are oval shaped switchboard cables placed on edge?			
3. Are cables twisted or crossed on cable rack?			
4. Do cables conform to the bending radii and position at turns or bends?			
5. Is protection provided where cable sheaths contact rough or sharp edges or metal?			
6. Are cables turned off over side of cable racks formed with minimum allowable radii?			
7. Are cables turned off rack horizontally and then up?			
8. Do cables to the distributing frame enter on the vertical side?			
9. Are cables serving the horizontal side of a distributing frame secured to the transverse arms near the vertical upright?			
10. Are cable tags properly prepared and in accordance with the cable running list?			
11. Are cable tags secured at each end of cable run?			
12. Have cable tags been removed upon completion of verification and termination?			
13. Are cable butts located as near as practicable to the point where the first wires turn out?			
14. Are cable butts properly treated?			

Figure 6-4. QC Checklist - Installation (Continued).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 4 OF 7 PAGES		
		YES	NO	NA
15. Is insulation of wires undamaged at butt location?				
16. Are unused and spare wires protected at butt location?				
F. Securing Cable				
1. Is starting stitch properly made and placed?				
2. Is required Kansas City stitch properly made?				
3. Are first and succeeding layers of cable properly secured?				
4. Are cables secured at every cable rack cross strap?				
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?				
6. Are lock stitches properly made and spaced?				
7. Are splices in twine properly made?				
G. Sewed Forms				
1. Is proper size twine used for the diameter of the form?				
2. Are proper number of strands used?				
3. Are stitches properly spaced?				
H. Butting and Stripping				
1. Are proper tools used for butting and stripping of cable?				
2. Are cable butts properly dressed?				
3. Is proper distance maintained from cable butt to fanning strip?				
I. Fanned Forms				
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?				
2. Are conductors in fanned forms not twisted and bunched?				

Figure 6-4. QC Checklist - Installation (Continued).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 5 OF 7 PAGES		
		YES	NO	NA
3. Are fanned forms straight and taut from butt location to fanning strip?				
4. Is length of skimmers correct?				
5. Has color code been properly followed?				
6. Are spare wires disposed of properly?				
J. Stenciling				
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?				
2. Are designations correctly located?				
3. Are corrected size designations used on particular types of apparatus or equipment?				
K. Strapping				
1. Are straps properly placed?				
2. Is correct type of strap wire used?				
3. Does insulation extend to terminal?				
4. Are straps placed so as to not interfere with operation of apparatus?				
5. Is removal of apparatus not blocked?				
6. Are designations not obscured?				
L. Connecting and Soldering				
1. Is soldering clamp used when connecting wires?				
2. Are connections made on terminal in proper manner?				
3. Is all soldering done with standard resin core solder?				
4. Are connections secure and free of foreign substances?				
5. Have all unsightly flux and excess globules of solder been removed?				
6. Is insulation on skimmers not burnt or otherwise damaged?				

Figure 6-4. QC Checklist - Installation (Continued).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 6 OF 7 PAGES		
		YES	NO	NA
7. Do skinners on connected terminals not exceed 1/16 in?				
8. Are all conductors given a continuity test after connection is made?				
M. <u>Transistor Soldering Techniques</u>				
1. Is caution exercised to assure that excessive heat does not destroy transistors?				
2. Are safeguards in effect to prevent leakage current at the end of an electrical soldering iron from destroying transistors?				
N. <u>Wrapped Connections</u>				
1. Are wrapped connections applied only on suitable terminals?				
2. Are connections essentially straight and free of angular bends or cramps?				
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?				
4. Are wrapped connectors soldered where applicable?				
O. <u>Cross Connections</u>				
1. Are jumpers properly routed at distribution frame?				
2. Do jumpers have sufficient slack after connection?				
3. Are conductors not twisted between fanning strip and terminal?				
4. Does twist remain in conductors beyond rear of fanning strip?				
5. Are jumpers properly dressed?				
6. Has excess solder been removed from terminals?				

Figure 6-4. QC Checklist - Installation (Continued).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 7 OF 7 PAGES		
		YES	NO	NA
<p>P. <u>Equipment and Signal Grounds</u></p> <p>Are equipment and signal ground installed in accordance with applicable codes and standards and in accordance with installation drawings?</p>				
<p>Q. <u>Conduit</u></p> <p>1. Are burrs removed from conduit after cutting?</p> <p>2. Is bending radii in accordance with AFTO 31-10-12?</p> <p>3. Are there no more than four 90 degree bends in a single conduit run?</p> <p>4. Does number of conductors in conduit conform to AFTO 31-10-12?</p> <p>5. Are conduits supported at proper intervals?</p> <p>6. Have all fittings been tightened after installation?</p>				
<p>R. <u>Ducts (RF Shieldings)</u></p> <p>1. Are hangers for overhead ducts mounted first?</p> <p>2. Is proper type mallet used in assembly?</p> <p>3. Are flange sections cleaned before installation?</p>				
<p>S. <u>Coaxial Cables</u></p> <p>Is cable inspected for possible damage prior to installation?</p>				

Figure 6-4. QC Checklist - Installation (Continued).

SECTION 7. TEST AND ACCEPTANCE

7.1 GENERAL. This section contains the tests to be performed, test methods, procedures, and equipment to be used in the testing and checkout of the four types of 48-V dc battery facilities.

7.2 DESCRIPTION OF FACILITIES. See paragraph 1.6 and table 2-1.

7.3 INSPECTIONS, MEASUREMENTS, AND TESTS TO BE PERFORMED. Tests listed in paragraphs 7.3.1 through 7.3.3 are performed by the installation team. These are classified as shakedown tests. Tests 7.3.4 and 7.3.5 are acceptance tests, performed by the test and acceptance team.

7.3.1 New Battery Bank. Perform the inspections, tests, and measurements listed in table 7-1.

7.3.2 Main Rectifier-Chargers. Perform the measurements and tests listed in table 7-2.

7.3.3 End Cell Rectifier-Charger. Perform the measurements and tests listed in table 7-3.

7.3.4 Complete Battery Facility, Test Status. The tests outlined in tables 7-1 through 7-3 must be completed prior to testing the complete facility. Perform the measurements and tests listed in table 7-4.

7.3.5 Complete Battery Facility, Actual Operation. Perform the measurements and tests listed in table 7-5. If all readings are normal the new facility should be placed in service.

7.4 TEST EQUIPMENT REQUIRED.

<u>Qty.</u>	<u>Description</u>	<u>Type</u>
1	Digital multimeter (DMM), 1 mV-500 V ac and dc, 2% accuracy or better, battery powered, hand-held (complete with battery and charger)	HP 970A or equal
1	Clamp-on, recording ac and dc ammeter, 0 to 400 A ac, 0-800 A dc, with leads, connectors, and chart paper	Pacer Industries Model 720RA or equal

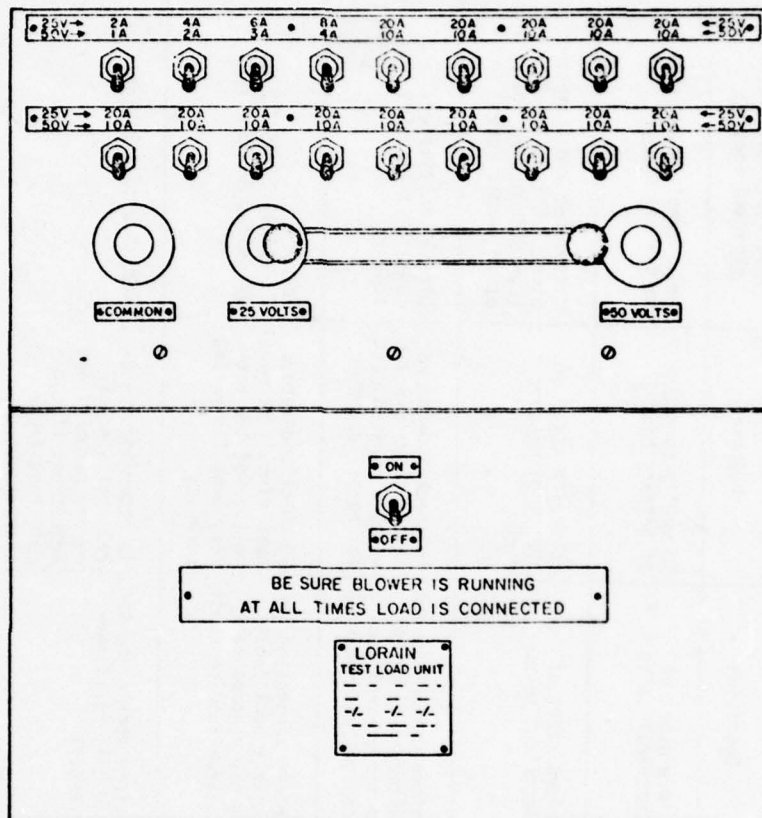
SEIP 020

<u>Qty.</u>	<u>Description</u>	<u>Type</u>
1	Clamp-on ac ammeter with phase rotation checker and leads	Amprobe RS-3 or equal
1	Oscilloscope, portable, response to 20 MHz or higher, with test probe	HP 1700B, Tektronix 465, or equal
1	Noise measuring meter (with C-message filter)	HP 3555A or equal
1 or 2*	Dummy load, resistive, fan cooled, 150 A dc at 50 V dc, continuous operation (see figure 7-1)	Lorain Model Y1
2**	Interconnecting cables, each 20 feet long, No. 2 AWG, fine-stranded, insulated (welding cable)	Anixter 5J-021
2	Lugs, copper, #4 to #1 AWG	Thomas & Betts #31007
1	Battery hydrometer with long tip	Included with battery facility
1	Battery thermometer	Included with battery facility

*Two dummy loads are generally required for testing the 200- and 400-A battery facilities.

**Per dummy load

LORAIN MODEL Y1, SPEC. NO. 5883-101



VOLTS: 50
 LOAD: 1 A-150 A (1-A STEPS)
 MOTOR: 115-V 60-Hz AC
 WEIGHT: 55 LBS, PORTABLE

NOTES:

1. A SLIDING PLATE COVERS THE JACK OF THE RANGE NOT IN USE.
2. IN ADDITION TO REGULAR STATION LOAD, TWO DUMMY LOADS ARE REQUIRED FOR LOADS OVER 200 TO 300 A. FOR TESTING THE 400-A FACILITY AT 100% LOAD, EITHER A NORMAL STATION LOAD OF 100 A PLUS TWO DUMMY LOADS, OR A THIRD DUMMY LOAD IS REQUIRED.

Figure 7-1. Resistive Adjustable Dummy Load.

Table 7-1. Inspections, Tests, and Measurements on Battery Banks

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
a. Visual inspection of all cells and intercell connectors	Before start of electrical tests	To verify condition of battery bank	None; complete and with no visible damage
b. Specific gravity of all cells	Before start of electrical tests	To verify state of charge of battery bank	Hydrometer and thermometer; 1.215 at 77° F. (Correct reading for other temperatures)
c. Measure the open-circuit cell voltage of each cell	Before connecting the battery bank cables to the control rack (charge fuse removed)	To check and record initial open-circuit voltage of each cell for record purposes	Digital multimeter, (DMM); 2.1 to 2.0 V dc/cell
d. Measure the total main battery terminal voltage	Before connecting the battery bank cables to the control rack (charge fuse removed)	To check and record open-circuit terminal voltage of the battery bank for record purposes	DMM 23 cells, 46-48.3 V dc 24 cells, 48-50.4 V dc
e. Measure the voltage across the 3 end cells	Before connecting the end cell rectifier-chargers	To determine the 3-cell voltage for record purposes and adjustment of end cell rectifier-charger output voltage	DMM; 5.9 to 6.3 V dc

Table 7-2. Measurements and Tests on Individual Main Rectifier-Chargers

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
a. Ac supply voltage reading ac circuit breaker panel	Normal ac supply on	Reference for ac voltage drop readings	Digital multimeter (DMM): rated V ac, line or line-to-line, $\pm 10\%$
b. Ac phase rotation at rectifier-charger terminals	Normal ac supply on	To verify proper 3-phase ac input wiring at rectifier-charger	Ac phase checker attachment and Amprobe RS-3 clamp-on ammeter; correct phase sequence
c. Ac input terminal voltage, no load	Rectifier-chargers on but not loaded	To check ac voltage drop at no load	DMM, within 1/2% of supply voltage reading (measurement a)
d. Ac input terminal voltage, full load	Rectifier-chargers on and fully loaded by dummy load(s). See figure 7-1	To check ac voltage drop at full load	DDM and dummy load(s); within 2% of ac supply voltage reading (measurement c)
e. Ac input current reading at full load	Rectifier-chargers on and fully loaded by dummy load(s). See figure 7-1	To verify ac input current and proper circuit breaker size	Clamp-on ac ammeter and dummy load(s); within 10% of manufacturer's specifications. Circuit breaker should not trip

Table 7-2. Measurements and Tests on Individual Main Rectifier-Chargers (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
f. Dc output voltage, no load, float minimum	Normal ac input voltage. Output not loaded. Minimum float voltage setting	To check minimum no- load float voltage and float voltage regulation without load	DMM; 48.3 to 48.8 V dc
g. Dc output voltage, no load, float maximum	Normal ac input volt- age. Output not loaded. Maximum float voltage setting	To check maximum no- load float voltage and float voltage reg- ulation without load	DMM; 55.2 to 55.8 V dc
h. Dc output voltage, full load, float minimum	Normal ac input volt- age. Output fully loaded. Minimum float voltage setting	To check minimum float voltage regula- tion with load	DMM; not less than 47.8 V dc
i. Dc output voltage, full load, float maximum	Normal ac input volt- age. Output fully loaded. Maximum float voltage setting	To check maximum float voltage regu- lation with load	DMM; not less than 54.6 V dc

Table 7-2. Measurements and Tests on Individual Main Rectifier-Chargers (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
j. Dc output voltage, no load, equalize minimum	Normal ac input volt- age. Output not loaded. Minimum equalize voltage setting	To check minimum no- load equalize volt- age and equalize voltage regulation without load	DMM; 48.3 to 48.8 V dc
k. Dc output voltage, no load, equalize maximum	Normal ac input volt- age. Output not loaded. Maximum equalize voltage setting	To check maximum no- load equalize volt- age and equalize voltage regulation without load	DMM; 58.8 to 59.6 V dc
l. Dc output voltage, full load, equalize minimum	Normal ac input volt- age. Output fully loaded. Minimum equalize voltage setting	To check minimum equalize voltage regulation with load	DMM; not less than 47.3 V dc
m. Dc output voltage, full load, equalize maximum	Normal ac input volt- age. Output fully loaded. Maximum equalize voltage setting	To check maximum equalize voltage regulation with load	DMM; not less than 57.6 V dc

Table 7-2. Measurements and Tests on Individual Main Rectifier-Chargers (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
n. Charge fail alarm	Normal ac input voltage. No load	To check charge fail alarm operation	None; alarm relay and lamp operated
o. High voltage alarm	Normal ac input, with or without load	To check high voltage alarm setting and adjust if necessary	DMM; set to 56 V dc
p. Low voltage alarm	No ac input, with or without load	To check low voltage alarm operation	DMM; factory set to 47.15 V dc
q. Output ripple, impulse, and wideband noise	Output fully loaded by dummy load	To measure ripple, impulse, and wideband noise of each rectifier-charger before connecting to battery bank	Oscilloscope; not more than 1000 mVp-p of ripple, impulse, and wideband noise from dc to 20 MHz

Table 7-3. Measurements and Tests on End Cell Rectifier-Chargers

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
a. Ac supply voltage reading at circuit breaker panel	Normal ac supply on	Reference for ac voltage drop readings	Digital multimeter (DMM); 120 or 220 V ac, line-to-neutral $\pm 10\%$
b. Ac input terminal voltage, no load	Rectifier-chargers on but not loaded	To check ac voltage drop at no load	DMM; within 1/2% of supply voltage reading (measurement a)
c. Ac input terminal voltage, heavily loaded NOTE: Use the 25-V dc position on the dummy load(s)	Normal ac supply on	To check ac voltage drop with a heavy load	DMM; within 2% of ac supply voltage reading (measurement b)
d. Ac input current reading, heavily loaded NOTE: Use the 25-V dc position on the loads	Rectifier-chargers on, set for maximum output and heavily loaded by dummy load(s)	To verify ac input current and proper circuit breaker size	Clamp-on ac ammeter; within 20% of manufacturer's specifications, depending on actual load. Circuit breaker should not trip

Table 7-3. Measurements and Tests on End Cell Rectifier-Chargers (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
e. Dc output voltage, no load	Normal ac input voltage. Output not loaded	To check no-load charging voltage	DMM; 6.3 to 6.75 V dc screwdriver adjustment
f. Dc output voltage, heavily loaded	Normal ac input voltage. Output loaded by dummy load(s)	To check loaded charging voltage and regulation with load	DMM; same as above. Set to 6.60 V dc for 3 cells
g. Charge fail alarm	Normal ac input voltage. No load	To check charge fail alarm operation	None; alarm relay and lamp operated
h. Output ripple, impulse, and wideband noise	Output loaded to maximum or nearly maximum by dummy load(s)	To measure ripple, impulse, and wideband noise of end cell rectifier-charger	Oscilloscope; not more than 500 mVp-p of ripple, impulse and wideband noise from dc to 20 MHz

NOTE: If all results are satisfactory, the main and end cell rectifier-chargers should be adjusted to match the terminal voltages of the main battery and end cells (where applicable). If the voltages are matched, there is no sparking when the charge or battery fuses are inserted in their respective holders.) With the charge or battery fuses in place, gradually raise the float voltages to the normal setting as shown in a of table 7-4 for the particular battery facility configuration.

Table 7-4. Measurements and Tests on Complete Battery Facility, Test Status

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
a. Total terminal voltage of the battery bank in float operation without load	After connecting the battery bank and all rectifier-chargers. In normal float operations without load	To check float adjustment of rectifier-chargers	Digital multimeter (DMM); 50.6 V dc for 23 cells 52.8 V dc for 24 cells 57.2 V dc for 26 cells Adjust all rectifier-chargers for the above values if necessary
b. Float charging voltage at rectifier-charger terminals and battery bank terminals under load	During normal float operation with heavy (75 to 100%) load applied with dummy load (see figure 7-1)	To check float voltage regulation of rectifier-chargers under load and voltage drop between rectifier-chargers and battery bank	DMM; not more than 0.5 V dc total voltage drop between rectifier-chargers and battery terminals. Not more than 1 V difference between no-load and full-load battery terminal voltage reading
c. Trickle charge current of battery bank	After an equalize period of 48 hours at 2.33 V/c followed by 1 hour at normal float voltage. Measure with a 25%, 50%, and 75% load	To record trickle charge current magnitude for various loads	Clamp-on dc/ac ammeter; 0.5 to 2 A dc

Table 7-4. Measurements and Tests on Complete Battery Facility, Test Status (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
d. Ampere-hour capacity test of battery bank	After an equalize period of 24 hours at 2.33 V/c followed by 1 hour at normal float voltage	To verify the design ampere-hour capacity of the battery bank	Dummy load(s) with cables and terminal lugs, DMM; recording clamp-on dc/ac ammeter with leads and connectors. See paragraph 7.6.7
e. Recharge (equalize) voltage at rectifier-charger terminals and battery bank terminals while recharging battery bank	After discharge of battery bank to 45.5 V dc	To set equalize voltage adjustment of rectifier-chargers, check voltage drop between chargers and battery bank under fast recharge conditions and test rectifier-chargers	DMM: set equalize voltage adjustment as follows: 53.6 V dc across 23 cells 55.9 V dc across 24 cells 60.6 V dc across 26 cells Drop shall be not more than 1 V dc between rectifier-chargers and battery bank
f. Normal recharge current of battery bank	After discharge of battery bank to 45.5 V dc	To record normal recharge current for record purposes	Clamp-on recording dc/ac ammeter; 100% output from all rectifier-chargers, tapering gradually to the trickle current value

NOTE: If all measurements and tests were completed successfully, the battery facility is ready for final testing in actual service. To place the new battery facility in service, insert the load fuse(s).

Table 7-5. Measurements and Tests on Complete Battery Facility, Actual Operation

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
a. Load voltage at main distribution bars	During normal float operation and station load	To verify correct load voltage	Digital multimeter (DMM); 49.1-50.1 V 23-cell 49.3-50.5 V 24-cell 49.1-50.1 V 26-cell
b. Normal load current	During normal float operation	To record load current for record purposes and compare meter readings	Built-in load ammeters of rectifier-chargers, control rack or distribution cabinet ammeter, and clamp on dc/ac ammeter
c. Load current when on battery power, normal station load	Switched to battery power	To record load current for record purposes	Control rack or distribution cabinet ammeter, or clamp-on dc/ac ammeter
d. CEMF cell switching contactor operation when discharging (for CEMF-cell battery facilities)	Switched to battery power. Loaded to at least 1/2 of full load	To evaluate performance of CEMF cell switch when discharging	Built-in ammeter, DMM; shorting out the CEMF cell at 47.5 V dc
e. End cell switching operation when discharging (for end cell battery facilities)	Switched to battery power. Loaded to at least 1/2 of full load	To evaluate performance of the end cell switch when discharging	Built-in load ammeter, DMM; to switch in the 3 end cells at 46.0 V dc

Table 7-5. Measurements and Tests on Complete Battery Facility, Actual Operation (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
f. CEMF cell switching contactor operation when recharging (for CEMF cell battery facilities)	During recharge operation. Loaded at least 1/2 of full load	To evaluate performance of the CEMF cell switch when recharging	DMM, built-in ammeters; switching in the CEMF cell at 51.5 V dc
g. End cell switching operation when recharging (for end cell battery facilities)	During recharge operation. Loaded at least 1/2 of full load	To evaluate performance of the end cell switch when recharging	DMM, built-in ammeters; switching out the 3 end cells at 53.0 V dc
h. Output ripple, impulse, and wideband noise at the distribution bars, both wideband and C-message	During normal float and recharge operations; loaded at least 2/3 of full load	To measure the output ripple, impulse, and wideband noise from 0 to 20 MHz	Oscilloscope and noise meter; should not exceed 200 mVp-p wideband; 500 mVp-p is allowed for electromechanical telephone switching equipment. Less than 32 dBmC using the noise meter
i. Powerboard fuse fail alarm. Check each fuse position	Normal battery facility operation	To check blown fuse alarm operation	Blown fuse of each type. The blown fuse alarm lamp and relay should operate

Table 7-5. Measurements and Tests on Complete Battery Facility, Actual Operation (Continued)

Inspection, measurement, or test	Condition	Purpose	Test equipment and expected reading
j. Powerboard combined rectifier-charger fail alarm	With all rectifier-chargers switched off	To check powerboard rectifier fail alarm operation	The powerboard rectifier fail alarm lamp and relay should operate the alarm cutoff (ACO) key. The ACO lamp should light
k. Powerboard hi/lo voltage alarm - high voltage	One rectifier-charger switched to equalize; output voltage raised above 53 V dc	To check the powerboard high voltage alarm activation	DMM and powerboard voltmeter; the hi/lo voltage alarm lamp and relay should operate at 53 V dc. Adjust to this value if necessary
1. Powerboard hi/lo voltage alarm - low voltage	All rectifier-chargers off. Battery bank discharging	To check the powerboard low voltage alarm activation	DMM and powerboard voltmeter; the hi/lo voltage alarm lamp and relay should operate at 46 V dc. Adjust to this value if necessary

7.5 GENERAL TEST CONDITIONS.

7.5.1 All tests can be conducted under normal operating environmental conditions of temperature, humidity, and power unless stated otherwise in the particular test.

7.5.2 The calibration of all test equipment shall be current. Test equipment operation manuals shall be available with the equipment.

7.5.3 All manufacturers technical documentation for the battery, rectifier-chargers, control rack, and distribution facilities and all site engineering/installation drawings shall be available for reference.

7.6 TEST METHODS AND PROCEDURES.

7.6.1 Specific Gravity Readings With a Hydrometer.

a. Draw sufficient electrolyte into the barrel, holding the syringe vertical with no hand pressure on bulb, so that the float is freely floating without touching sides or top of syringe. The specific gravity is read on the hydrometer scale at the flat surface of the electrolyte. (NOTE: If the inside of the hydrometer is dirty, the glass barrel and float should be cleaned with soap and water as required for ease of reading and float accuracy.)

b. When electrolyte withdrawal tubes are provided in the cell, these should be used, since they permit sampling of the electrolyte at a point one-third down from the top of the plates. A long rubber tip on the hydrometer is inserted into the tube to provide an average value of cell specific gravity and a more accurate indication on the state of charge. Fill and empty the hydrometer at least once in each cell before reading. This will give a more accurate reading of electrolyte within the tube. When taking specific gravity readings, corrections must be made for variations in temperature of the electrolyte. For each 3° F (1.67° C) in temperature of the electrolyte above 77° F (25° C), add one point (.001) in specific gravity to the observed hydrometer reading; for each 3° F (1.67° C) in temperature below 77° F (25° C), subtract one point (.001) in specific gravity from the observed hydrometer reading. Examples of applying the temperature correction are given below:

<u>Hydrometer reading</u>	<u>Cell temperature</u>	<u>Correction</u>	<u>Reading corrected to 77° F (25° C)</u>
1.213 sp. gr.	68° F (20° C)	-.003 points	= 1.210 sp. gr.
1.204 sp. gr.	95° F (35° C)	+.006 points	= 1.210 sp. gr.

c. When recording the hydrometer reading, also record the level of electrolyte in the cell for later correction of reading with level changes.

d. For correct use of an optical hydrometer, consult the manufacturer's literature.

7.6.2 Dc Voltage Readings. Set the digital multimeter (DMM) function switch to "volts dc" or "V=" and set range (0-10 or 0-100) if the meter is not autoranging. Place the plus/minus leads across the cell terminals for reading individual cell voltages, or across the end plus/minus terminals of the battery bank for a total voltage measurement. Record the voltage to the resolution capability of the voltmeter.

7.6.3 Ac Voltage Readings. Set the DMM function switch to "volts ac" or "V=" and set range (0-500) if the DMM is not autoranging. Place the plus/minus leads across the ac terminals for reading supply voltages at the power panels and inside the rectifier-chargers. Record to the nearest 0.1 V ac.

7.6.4 Phase Rotation Test. Connect the Amprobe phase rotation attachment to the Amprobe clamp-on ammeter. Set the clamp-on ammeter function switch to the 500-V ac scale. Attach the leads from the phase rotation attachment to the 3-phase terminals of the rectifier-charger input in accordance with the instructions on the attachment. Verify that the ac wires are phased properly or reconnect correctly.

7.6.5 Alarm Lamp and Relay. While performing the maximum and minimum output voltage measurements, note the voltages at which the high and low voltage alarm lamps and relay contacts are activated. If necessary, adjust the high and low voltage alarm settings to the values listed in tables 7-2 and 7-5.

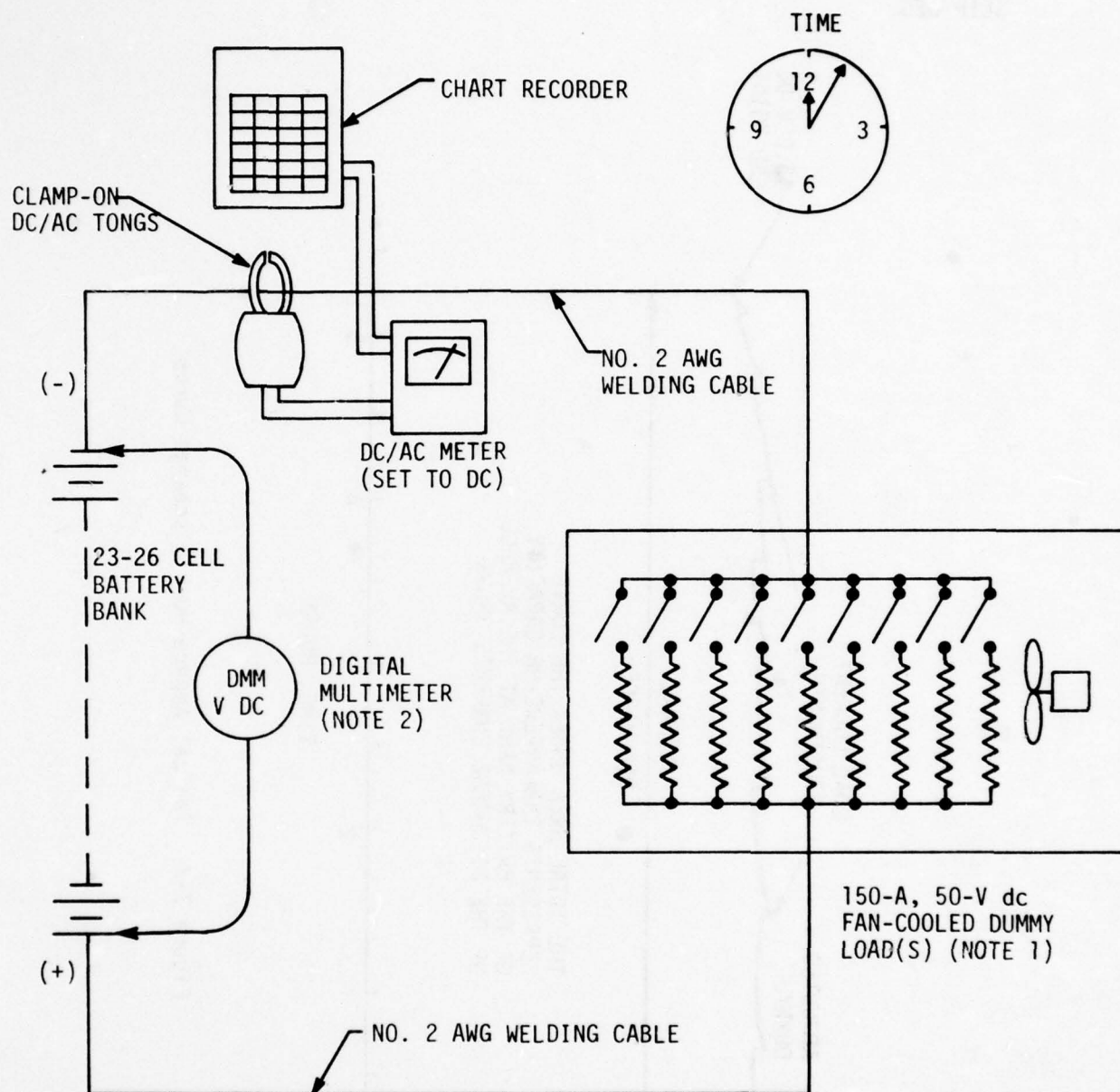
7.6.6 Blown Fuse Alarm. Blown fuse alarm operation can be checked in an operational configuration by inserting a blown fuse of the particular type into the fuse holder and observing that the alarm lamp lights and alarm contact is operated. Contact operation can be checked with the DMM set to "ohms" or "kΩ."

7.6.7 Ampere-Hour Capacity Measurement. The battery must be equalized and fully charged for these tests. Full charge is indicated by taking hydrometer readings periodically during a charge period of several days. When the reading remains the same at 1.215 or higher, the battery can be assumed to be fully charged. Proceed as follows:

- a. Remove any loads which may be connected.
- b. Set all load switches on the dummy load to zero and connect the cables for 50-V dc operation.
- c. Switch off the rectifier-chargers and remove the charge or battery fuses.
- d. Connect the dummy load(s) to the battery bank. See figure 7-2.
- e. Connect the test equipment as shown in figure 7-2.
- f. Check the operation of the recording dc/ac ammeter; adjust the chart paper and zero the recording pen while the recorder is running.
- g. Determine which dummy load switches to operate for the desired full load.
- h. At a selected time, operate the switches. Record the time on the chart.
- i. Observe the operation and adjust the dummy load to maintain the current at approximately full load. Discharge to the predetermined total battery terminal voltage of 45.5 V dc.
- j. Stop the discharge when the battery terminal voltage has dropped to 45.5 V dc. Record the time.
- k. The area under the chart recording of amperes versus time in hours is the ampere-hour capacity of the battery bank when discharged at the average of the ampere rates shown (see figure 7-3).

7.6.8 Operation of CEMF Cell Control. This is test "f" in table 7-5.

- a. Connect the dummy load to the load buses.



NOTES:

1. ADJUST CURRENT TO FULL LOAD PERIODICALLY. SEE FIGURE 7-3.
2. STOP DISCHARGE AT 45.5 V DC.

Figure 7-2. Test Equipment Connections For Ampere-Hour Capacity Test.

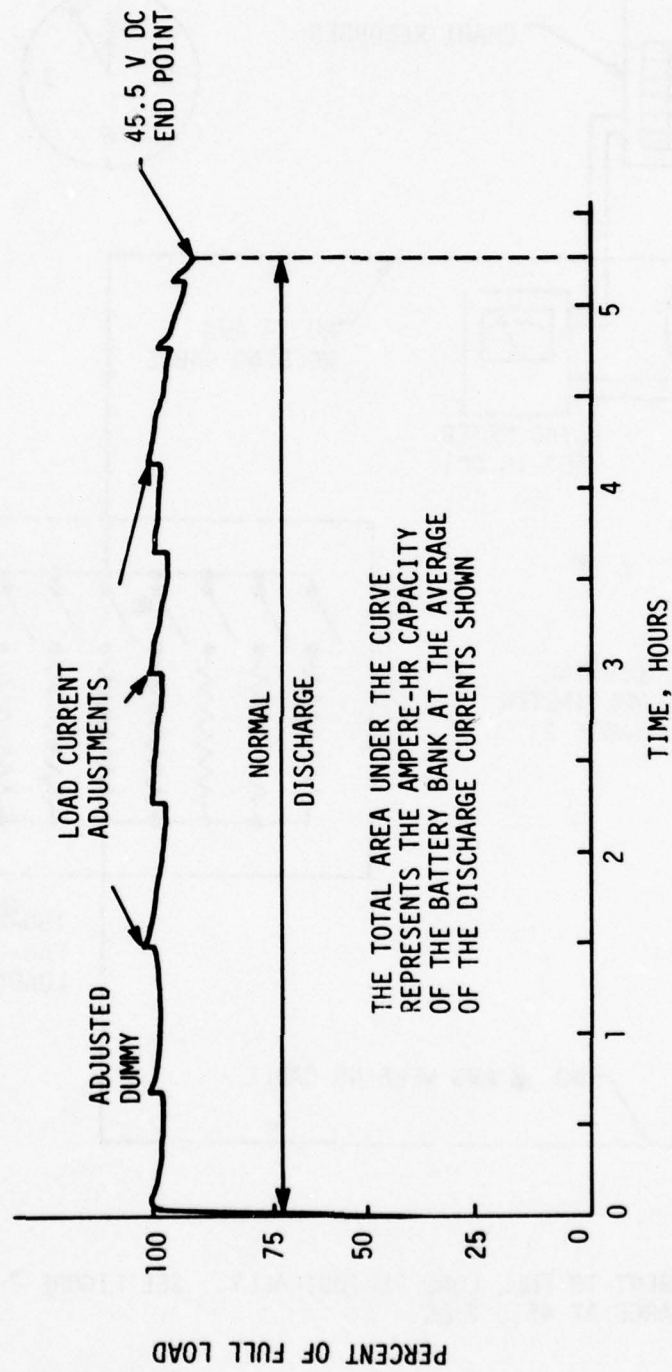


Figure 7-3. Typical Ampere-Hour Discharge Curve.

b. Also connect the DMM to the load buses for observing the voltage.

c. Switch off the rectifier-chargers so that the battery bank supplies the load.

d. Adjust the dummy load for a 50- to 80-percent load.

e. Observe the voltage across the load buses. At about 47.5 V dc the CEMF cell contactor will short the CEMF cell and the load voltage will rise. Note and record the voltage just before and after the switch.

f. If required, adjust the CEMF cell control circuit to switch at 47.5 V dc.

g. Switch on one rectifier-charger and reduce the load gradually. Observe the load voltage. At about 51.5 V dc the CEMF cell contactor will open to place the CEMF cell in the output circuit. Note and record the voltage just before and after the switching.

h. If necessary, adjust the CEMF cell control circuit to switch at 51.5 V dc. Refer to the manufacturer's manual.

7.6.9 Operation of End Cell Switch. This is test "g" in table 7-5.

a. Check the end cell switch operation, using the end cell test and meter panels. The test and meter panels should show a switch up from 23 to 26 cells at 46.0 V dc and a switch down from 26 to 23 cells at 53.0 V dc. Adjust to these values if necessary, using the manufacturer's manual.

b. In addition to any normal station load, connect one or two dummy loads to the load buses.

c. Connect the DMM to the load buses for observing the voltage.

d. Switch off the rectifier-chargers so that the battery bank supplies the load.

e. Adjust the dummy load(s) for a total load of about 300 amperes.

f. Observe the voltage across the load buses. At about 46.0 V dc the end cell will switch the load bus from the 23-cell to the 26-cell terminal. Note and record the voltage just before and after the switch.

g. If necessary, adjust the switching level to 46.0 V dc, using the test panel and manufacturer's instructions.

h. Switch on one or two rectifier-chargers and reduce the load gradually. At about 53.0 V dc the end cell switch will switch the load bar from the 26-cell to the 23-cell terminal. Note and record the voltage just before and after the switching.

i. Adjust the end cell control circuit if necessary, using the test panel and manufacturer's manual.

7.6.10 Output Ripple, Impulse, and Wideband Noise Measurement.

a. Load the battery facility to 75 percent, using the dummy load(s).

b. Connect shielded oscilloscope leads across the load buses. (Ensure that the ground lead of the oscilloscope is connected to the grounded load bus.)

c. Set the oscilloscope for a 100- or 10-ms sweep and adjust for suitable vertical sensitivity. Ripple at power line frequency and/or harmonics will be displayed. Record the amplitude and frequency. (A 3-phase, full-wave rectifier, operating from 60-Hz lines, generally produces the largest ripple at 360 Hz.) Refer to the manufacturer's manual for maximum output noise specifications. In general, ripple, impulse, and wideband noise should not exceed 200 mVp-p for electronic communications equipment. Noise up to 500 mVp-p is generally acceptable for electromechanical telephone switching equipment. Certain digital multiplex equipment may require power with not more than 100 mVp-p at the input terminals. The additional filtering should be provided on a case-by-case basis, using appropriate decentralizing filters.

d. Set the oscilloscope for various sweep rates between 10 ms and 0.1 μ s. Adjust for suitable vertical sensitivity. Wideband noise may be observed throughout the band with various amplitudes. Record the amplitude and approximate frequency of the highest noise voltages. Consult the manufacturer's literature for specifications on wideband noise output of this equipment.

7.6.11 Output Noise Measurement in dBrnC.

a. Using a capacitive-coupled test cable, connect the leads across the 48-V dc load bars. CAUTION: Use the capacitive-coupled test cable exactly as shown in figure 7-4 or the input transformer of the test set may be permanently damaged.

b. Set the HP-3555B noise weighting switch to "C-message" weighting and set the range for a convenient reading. NOTE: The HP-3555B should be powered from the internal battery source for this test.

c. Read and record the noise in dBrnC.

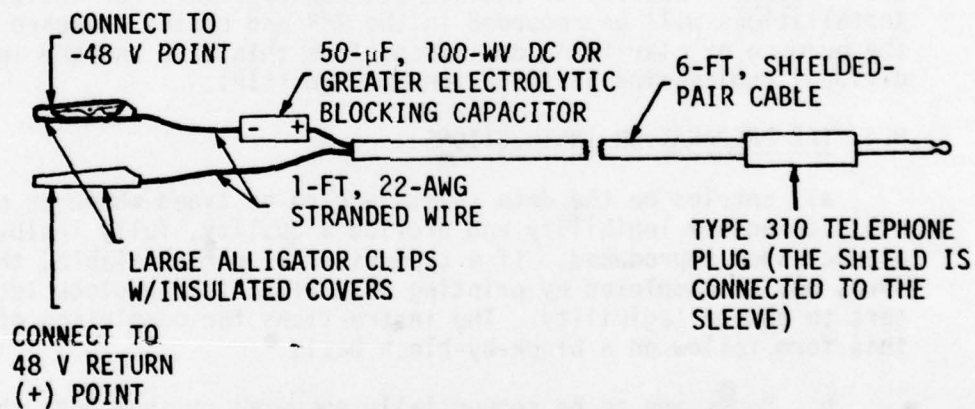


Figure 7-4. Capacitive-Coupled Test Cable Used With the Transmission and Noise Measuring Set.

SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The results of the QA inspections and acceptance tests specified in sections 6 and 7 will be documented on-site by the QAR/test director using USACEEIA FM 98-R, Technical Acceptance Recommendation (figure 8-1). The purpose of this technical document is to record the significant project information to include the scope of the effort, results and conclusions of the requisite inspections and tests, exceptions to the technical requirements, and recommendations regarding acceptance with or without exceptions or rejection of the work effort. The Technical Acceptance Recommendation (TAR) also allows other participants to indicate agreement or disagreement with the inspection and test assessments, and for the user to state a willingness to technically accept the installed system.

8.2 DISTRIBUTION. A copy of the TAR will be provided to the signing participants and the operating agency. The original copy will be maintained in the test agency project files, but copies will be reproduced and included as part of the test report.

8.3 WAIVERS. Waivers to include command approvals for individual installations will be recorded in the TAR and copies attached for the purpose of clarifying deviations from this SEIP and the individual engineering installation package (EIP).

8.4 TAR PREPARATION INSTRUCTIONS.

a. Entries on the data sheets are to be typed whenever possible to ensure legibility and provide a quality, fully legible product when reproduced. If a typewriter is not available, the forms may be completed by printing with black ink in block letters to ensure legibility. The instructions for completion of this form follow on a block-by-block basis.

b. Pages are to be sequentially numbered to show both the individual page number and the total number of pages constituting the completed TAR. Additionally, each page will be identified by the date, project, and contract number in the appropriate blocks.

c. Instructions for completion of the TAR are delineated in the following subparagraphs and will be completed in accordance with these instructions:

(1) DATE: Enter the day, month, and year of completion for this action (e.g., 1/1/79 as the first day of the first month of 1979).

(2) PROJECT/CONTRACT NUMBER: Enter the appropriate project or contract number. If this is a subproject or part of a subproject, provide all necessary information (i.e., IIP milestone number(s) and subproject number(s), as well as subdivision(s) to same).

(3) TITLE: Enter the project name or title.

(4) LOCATION: Enter the geographic location where the project was installed.

(5) FACILITY: Enter the name of the facility and other pertinent identifying information.

(6) TEST DIRECTOR: Enter the name, title, and grade of the test director or QAR assigned to this project.

(7) OPERATING AGENCY: Enter the name, symbol, and complete mailing address of the organization having O&M responsibility for this project, system, or equipment installation.

(8) ENGINEERING AGENCY: Enter the name, symbol, and complete mailing address of the organization having engineering cognizance and responsibility.

(9) INSTALLATION AGENCY: Enter the name, symbol, and complete mailing address of the organization having been tasked to install the TAR materiel.

(10) TESTING AGENCY: Enter the name, symbol, and complete mailing address of the QA and testing organization tasked for this project.

(11) PROJECT DESCRIPTION: Enter a brief and concise description of the project to which the TAR applies.

(12) MAJOR EQUIPMENT INSTALLED/RELOCATED: List the major items of equipment installed or relocated in accordance with the project requirements. Enter the BOM line item number, materiel description, assigned part number or National Stock Number, and the quantity of each major item.

(13) DOCUMENTATION: Enter the document identification (i.e., drawing number, technical manual number, etc.), title, and the quantity of each document provided to the operating unit as part of the project.

(14) EXCEPTIONS:

(a) Upon completion of installation and testing, any exceptions to the project requirements that require corrective action will be listed. Include complete identification of each missing item. Exceptions must be based on the specified requirements of the project, supportable through the test results or other valid documentation, fully described, and precisely identified.

(b) The appropriate exception block must be annotated, and separate sheets should be used for each category of exception.

(c) The test director will also enter the suggested action agency for each exception, recognizing that the test director may not always be in a position to determine the final action agency.

(d) For facilities that are becoming partially operational, identify installation agency actions remaining for project completion. In this situation, the Materiel Acceptance Record will show the tests that have been made, but will be identified as a partial record. A final Materiel Acceptance Record will be prepared after installation and testing of all remaining project equipment.

(15) REMARKS: The REMARKS section may be used to provide any additional information on or in support of a recommendation, commendation, or criticism in relation to the project installation, engineering, or testing. Entries may include:

(a) Shortcomings that do not require corrective action (not considered an exception).

(b) Recommendations for improving projects of a similar nature.

(c) Identification of support items that have not been accomplished, and a description of any activity in progress by the operating agency to satisfy the requirement.

(d) A description of test results with the performing agency and date(s) accomplished.

(e) A statement to the effect that the installation agency will forward final "as-built" drawings when completed.

(f) A description of the ac power system with identification of source and backup capability.

(g) A statement to indicate that a list of excess material was provided the operating command for final disposition or to identify material that was excess to the project.

(16) CERTIFICATION: Enter the signatures and certification that the project was installed, tested, and accepted for operation with or without exceptions as applicable.

SEIP 020

TECHNICAL ACCEPTANCE RECOMMENDATION (SUMMARY) (CCCR 702-2)		PAGE 1 OF 6 PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
FACILITY	TEST DIRECTOR	
OPERATING AGENCY		ENGINEERING AGENCY
INSTALLATION AGENCY		TESTING AGENCY
PROJECT DESCRIPTION		
<p>This Technical Acceptance Recommendation is executed by the on-site representatives of the installation, test, and operating agencies. It does not constitute official acceptance of the project but does certify that the MAJOR ITEMS INSTALLED AND DOCUMENTATION PROVIDED are as stated herein. This document further certifies that the project has been installed and performs satisfactorily in accordance with the requirements listed under REFERENCES, except as noted under EXCEPTIONS and REMARKS. Upon execution of this Technical Acceptance Recommendation, USACEEIA considers this project complete, except for such follow-on action as may be necessary to clear the EXCEPTIONS stated herein.</p>		

USACE IA FM 98-R

1 Jan 79 Replaces HQ USACEEIA CCC-TED-QA FM 98 which is obsolete.

Figure 8-1. Technical Acceptance Recommendation.

SEIP 020

TECHNICAL ACCEPTANCE RECOMMENDATION (DOCUMENTATION) (CCCR 702-2)		PAGE 3 OF 6 PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
PROJECT DOCUMENTATION PROVIDED		
REFERENCE DOCUMENTATION	TITLE	NO. OF COPIES

Figure 8-1. Technical Acceptance Recommendation (Continued).

TECHNICAL ACCEPTANCE RECOMMENDATION (EXCEPTIONS) (CCCR 702-2)		PAGE 4 OF 6 PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
EXCEPTIONS ENGINEERING <input type="checkbox"/> INSTALLATION <input type="checkbox"/> OTHER <input type="checkbox"/>		SUGGESTED ACTION AGENCY

Figure 8-1. Technical Acceptance Recommendation (Continued).

SEIP 020

[illegible]

Figure 8-1. Technical Acceptance Recommendation (Continued).

TECHNICAL ACCEPTANCE RECOMMENDATION (CERTIFICATION)		PAGE 6 OF 6 PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
<p align="center"><u>CERTIFICATION</u></p> <p>Acceptance tests and Quality Assurance Inspections are complete for equipment installed under this project.</p>		
WITHOUT EXCEPTIONS <input type="checkbox"/> WITH NOTED EXCEPTIONS <input type="checkbox"/>		
INSTALLATION AGENCY	SIGNATURE AND TITLE	
	PRINTED	
OPERATING AGENCY	SIGNATURE AND TITLE	
	PRINTED	
TEST AGENCY	SIGNATURE AND TITLE	
	PRINTED	
<p align="center"><u>ACCEPTANCE</u></p> <p>Equipment herein certified successfully installed and tested, is accepted for operation.</p>		
OPERATING COMMAND	SIGNATURE	
	TITLE	

Figure 8-1. Technical Acceptance Recommendation (Continued).

SEIP 020

(CC-OPS)

FOR THE COMMANDER:

OFFICIAL:

EUGENE J. VITETTA
Colonel, GS
Chief of Staff



BENNETT T. DINGWALL III
LTC, AGC
Adjutant General

DISTRIBUTION:

Special

- 5 - CC-PA-AMP
- 10 - CCC-CED-SEP
- 4 - CCC-CED-SW
- 4 - CCC-TED
- 5 - USACEI Bn
- 10 - USACEEIA-CONUS, ATTN: CCCN-TR, Fort Ritchie, MD 21719
- 10 - USACEEIA-EUR, APO New York 09056
- 10 - US Army Signal School, ATTN: ATSN-CD-MS, Fort Gordon, GA 31905
- 2 - US Army Materiel Development and Readiness Command, ATTN: CCN-PI-P, Washington, DC 20315
- 5 - 5th Signal Command, APO New York 09056
- 5 - 7th Signal Command, Fort Ritchie, MD 21719
- 3 - US Army Communications Command, ATTN: CC-OPS-PT, Fort Huachuca, AZ 85613
- 2 - US Army Training and Doctrine Command, ATTN: ATCE, Fort Monroe, VA 23351
- 2 - US Army Forces Command, ATTN: AFCE, Fort McPherson, GA 30330
- 2 - Defense Communications Agency, Technical Library Center, Code 205, Washington, DC 20305
- 12 - Defense Documentation Center, Cameron Station, Alexandria, VA 22314
- 2 - Keesler Technical Training Group, 3395th Tech. Trng. Gp., ATTN: TTE00A, Keesler AFB, MS 39534
- 2 - 1842 EEG (AFCS), ATTN: EEM, Scott AFB, IL 62225
- 2 - Naval Electronic Systems Command (NAVELEX), Code 51032, Washington, DC 20315

DEPARTMENT OF THE ARMY
US Army Communications-Electronics
Engineering Installation Agency
Fort Huachuca, Arizona 85613

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DoD 314



COMMANDER
US ARMY COMMUNICATIONS-ELECTRONICS
ENGINEERING INSTALLATION AGENCY
ATTN: CCC-CED-SEP
Fort Huachuca, Arizona 85613

DEPARTMENT OF THE ARMY
US Army Communications-Electronics
Engineering Installation Agency
Fort Huachuca, Arizona 85613

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DoD 314



COMMANDER
US ARMY COMMUNICATIONS-ELECTRONICS
ENGINEERING INSTALLATION AGENCY
ATTN: CCC-CED-SEP
Fort Huachuca, Arizona 85613

This standard engineering installation package is based on the most current thinking at US Army Communications Command. Your experience and help can improve our responsiveness in this area. Please send us your comments. Thanks.

Comments on SEIP ____ (please give number)

SEIP MGT Officer
AUTOVON 879-6719

How can we contact you?

Rank	Name	Duty position	Duty station	AUTOVON number
------	------	---------------	--------------	----------------

This standard engineering installation package is based on the most current thinking at US Army Communications Command. Your experience and help can improve our responsiveness in this area. Please send us your comments. Thanks.

Comments on SEIP ____ (please give number)

SEIP MGT Officer
AUTOVON 879-6719

How can we contact you?

Rank	Name	Duty position	Duty station	AUTOVON number
------	------	---------------	--------------	----------------